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# AUTOMOBILE JOURNAL

DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXVIII.

PAWTUCKET, R. I., AUGUST, 1920.

NO. 1.

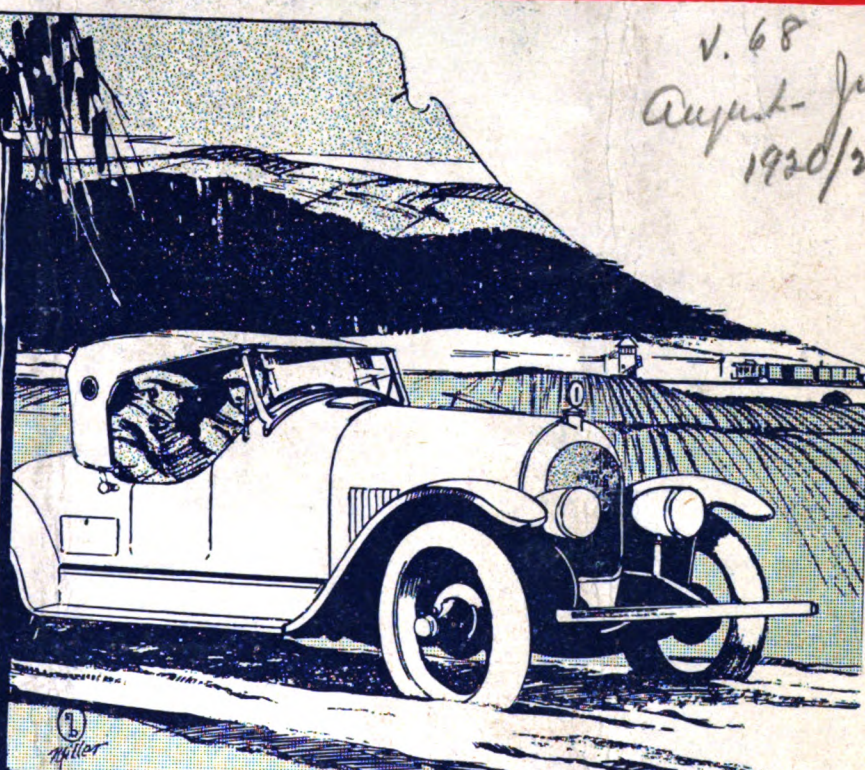
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STANDARD OIL COMPANY OF NEW YORK



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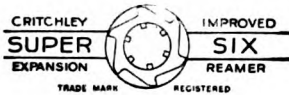
**The India Tire & Rubber Co.**

Akron     ∴     Ohio

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# better holes fewer dollars



"An old tool—  
under a new name"

Many mechanics have used Critchley Improved SUPER-SIX Expansion Reamers since we first began to make them. They're the same tools you've known as "the expansion reamers with the letter sizes," or, sometimes, merely as "the Critchley Improved."

We've chosen the new name—Critchley Improved SUPER-SIX Expansion Reamers—and the registered trade mark because we want to protect not only our own business in these reamers, but the reputation of this type of tool among the men who use them.

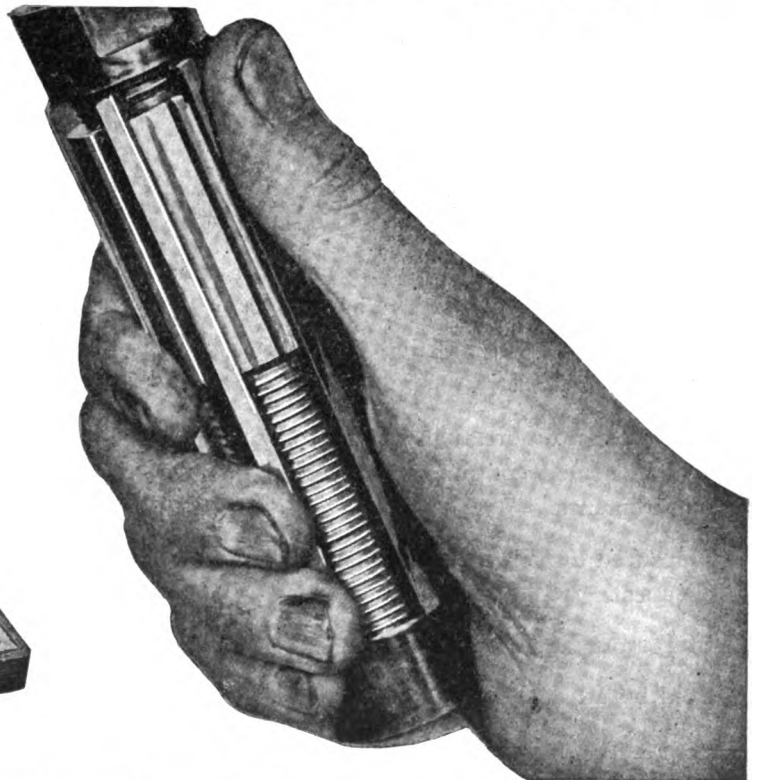
Ask your dealer for "the Critchley Improved Expansion Reamers with the SUPER-SIX trade mark." Write for grinding instructions and descriptive price list.

**Cutter & Wood Supply Co.**

62 PEARL STREET  
BOSTON 9. MASS.



115-12



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(When Writing to Advertisers, Please Mention the Automobile Journal.)

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**CAR EFFICIENCY,  
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WILLIAM H. BLACK.....Treasurer  
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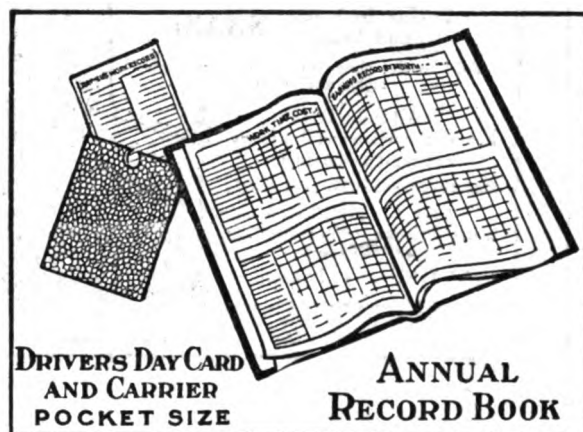
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**Know what it costs to Run your Truck**  
**Learn what your Truck Earns**  
**Know your Truck Profit and Loss**

## UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

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**Price \$10 — Delivered**

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"The Hotel of Easy Access"

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Parlor, bedroom  
and bath, \$3.00

Add to the above rates, 50c. for each  
additional person.

All Subway,  
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lead right to the door.

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OUR RESTAURANT  
is noted for its excellent food and  
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P. V. LAND - Manager

Centrally  
Located  
Near all the Famous  
Shops and Theatres





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AUTO-LITE LIGHTING AND  
STARTING SYSTEMS.  
Complete Stock of  
GENUINE PARTS.

All Work and Parts Guaranteed.

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74 CUMMINGTON ST., BOSTON, MASS.

## Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

### SAVE 50%

#### Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

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Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. CORMACK CO., Dept. 57, 560 Fifth Ave., New York City.

#### COTTON WASTE, WIPING RAGS, CHEESECLOTH.

Adapted for automobile use, in ¼ lb. and 1 lb. cotton bags and paper cartons. SOFT, CLEAN, WHITE COTTON WASTE.

Assorted wiping rags—New, clean sanitary. Sample on request.

STANDARD WASTE & RAG CO.  
568 W. 51st St. N. Y. C.

#### SPEED OR POWER FOR THE FORD.

Install a set of:

- 2½ — 1 Gears in the Racy Type
- 3 — 1 Gears in the Roadster
- 4 — 1 Gears in the Delivery

Our Trade Mark—A star on every gear insures quality.

DETROIT RADIATOR & SPECIALTY CO., 968 Woodward Ave., Detroit, Mich.

#### AUTO-TOP AND SEAT COVERS

\$7 up—parcel post prepaid. Easy to apply. Catalogue and samples free. Auto Equipment Co., 16 Canal, Cincinnati, O.

AUTO TIRE VULCANIZING, a growing profitable business. Easy to learn. Instruction book \$1. Three weeks, practical school course free. Plants \$50 up. Catalogue free. Equipment Co., 191 Canal, Cincinnati, O.

#### AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo, Overland and 200 other makes.

Motors, \$20.00 up	B. Presto Tanks, \$4.00
Magnetos, \$3.50 up	B. Presto Tanks, \$4.75
Cylinders, \$3.00 up	Bearings, 50c up
Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

### Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

## AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE, BUICK,  
STEVENS-DURYEA, KNOX, OVER-  
LAND, ETC.

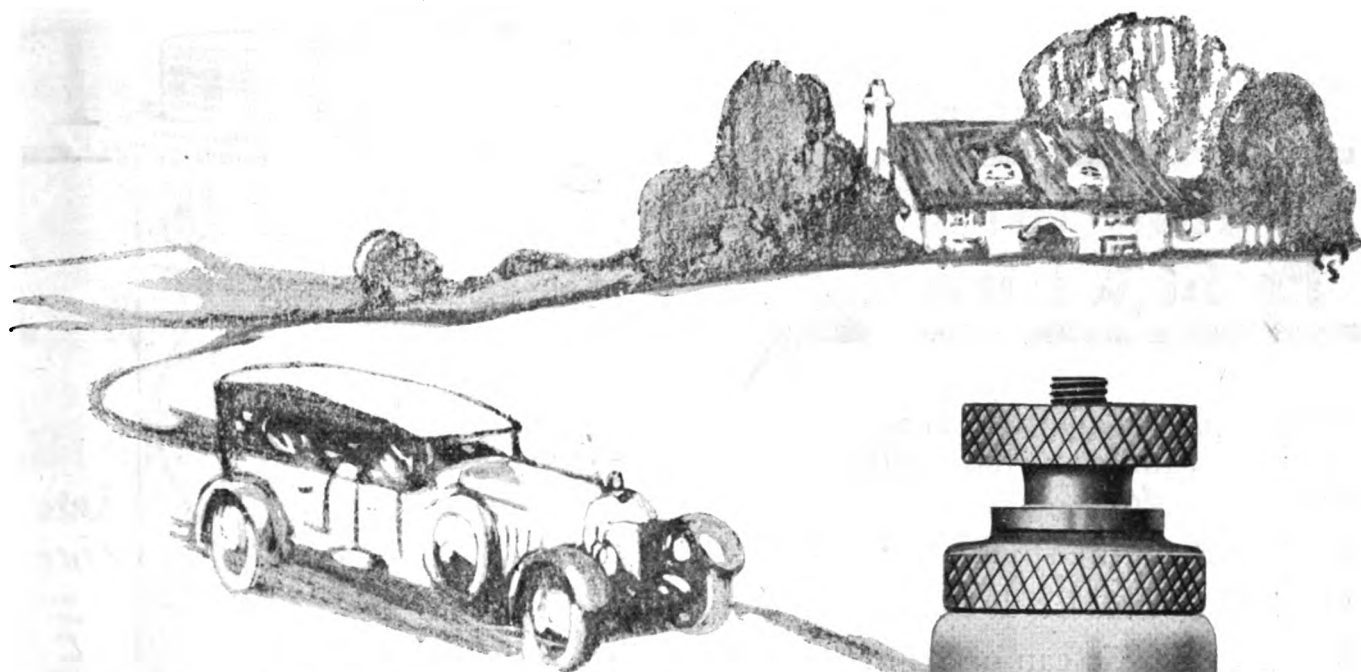
Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.00 up
Carburetors, 3.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

### BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



## Sterling Red Brand Plugs Give Motors Ample Power

It is the quick response when speed is demanded, the gruelling pull through mud or sand which tests the reserve power of a motor.

That reserve power is always assured when Sterling Red Brand Spark Plugs feed current to the cylinders.

No motor is better than its spark plugs, no spark plugs are more dependable than Sterling.

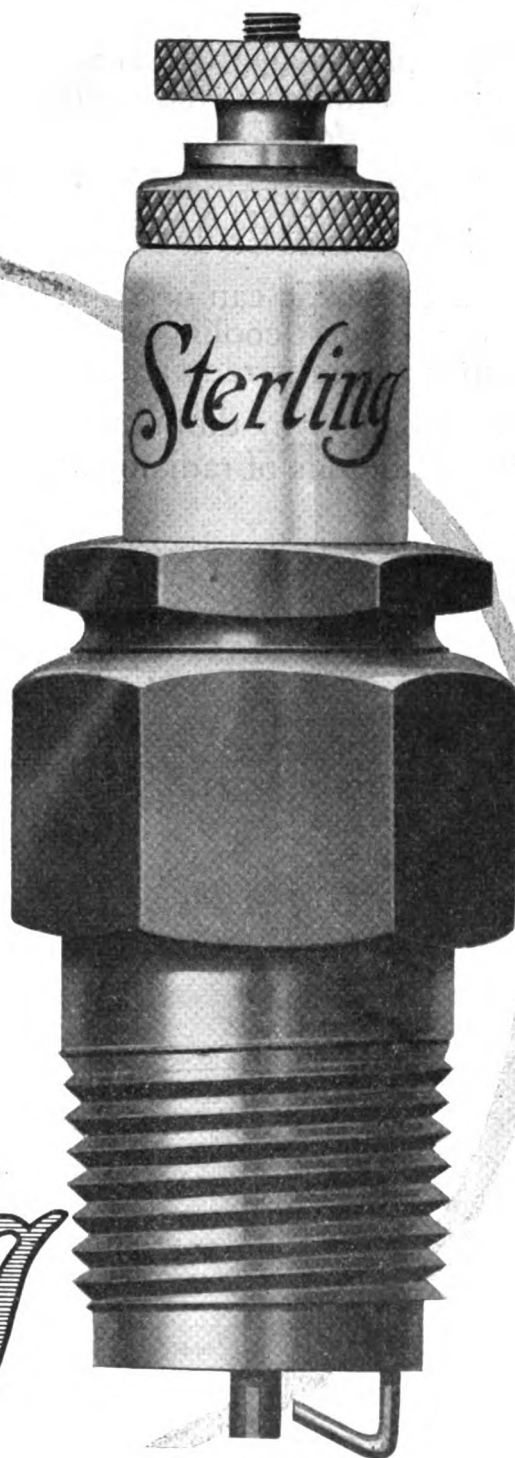
Progressive garages and supply dealers everywhere sell and endorse Sterling Red Brand Spark Plugs.

The Lockwood-Ash Motor Company  
2050 Douglas Street Jackson, Michigan

(74)

# Sterling

## Spark Plugs



SEPARABLE



CLEANABLE

(When Writing to Advertisers, Please Mention the Automobile Journal.)



## How to Make a Larger Profit With a Smaller Stock

If someone showed you how you could cut down your stock and make more money by doing it—*what would you do?*

You'd reduce the stock, of course!

That's the SE-MENT-OL argument exactly.

Because one 75c can of SE-MENT-OL will repair even the largest cooling system, it is not necessary to stock several sized cans.

This explains why thousands of successful dealers who used to stock *several* different brands of radiator repairers, now carry only



## SE-MENT-OL

*Liquid and Powder*

### Eleven Other Lively Sellers

Carbonox, the carbon remover.

Skalex, the radiator cleaner.

Valve Grinding Compound.

Iron Cement.

Color Varnishes.

Never Burn, engine enamel.

Rim and Gasket Shellac.

Leather Top and Upholstery Dressing.

Utility Black, retouching enamel.

Mohair Dressing and Lining Dye.

Neatsfoot Clutch and Brake Compound.

By concentrating on SE-MENT-OL, the *original*, self-acting radiator repairer, they find they can make a bigger profit with a smaller investment—get a quicker turnover—and keep the good will of their trade by giving them the most value for their money.

You take no chance in stocking SE-MENT-OL—it is *guaranteed* to repair quickly and *permanently* cooling system leaks. SE-MENT-OL Liquid kept in the radiator, will keep the cooling system leak-proof for the life of the car.

If you are not already selling SE-MENT-OL and other Norwesco products, better get acquainted right away—it will pay you well.

*Write today for dealer's proposition and discounts*

### The Northwestern Chemical Co.

728 State Street, Marietta, Ohio  
Canadian Factory: Montreal

41124A

# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., AUGUST, 1920.

NO. 1.

## Canada and Maritime Provinces Invite the Motor Tourist

**A**S THE motorist, after several seasons' enforced touring in America owing to unsettled and unsatisfactory conditions abroad, becomes familiar with the principal points of interest in the United States, the tendency is undoubtedly this year, more than ever before, to go over the northern border and, for the sake of variety, try out what Canada has to offer in the way of attractions.

And, in fact, the vast Dominion, with its continually increasing good roads and hospitable disposition to cater to the comfort and pleasure of the tourist from across the line in the way of hotel and other accommodations, offers a well-nigh inexhaustible field for touring amid the diversified scenes of lakes, rivers, seashore, woodland and mountains.

The sections most accessible and of the greatest interest, historically and scenically, are undoubtedly included in the region in the vicinity of the Great Lakes and comprised in the vast valley of the St. Lawrence river and its tribu-

taries, while the Province of New Brunswick and the peninsular of Nova Scotia are of especial attraction as including the picturesque land of Evangeline and the beautiful Bras d'Or Lake country.

The routes comprised in the group of itineraries given here will be confined principally to the section east of Hamilton, Ont., and south of Ottawa, encircling Lake Ontario and following the course of the St. Lawrence river, while the Maritime Province section includes the central and southern portion of New Brunswick and the Nova Scotian peninsular.

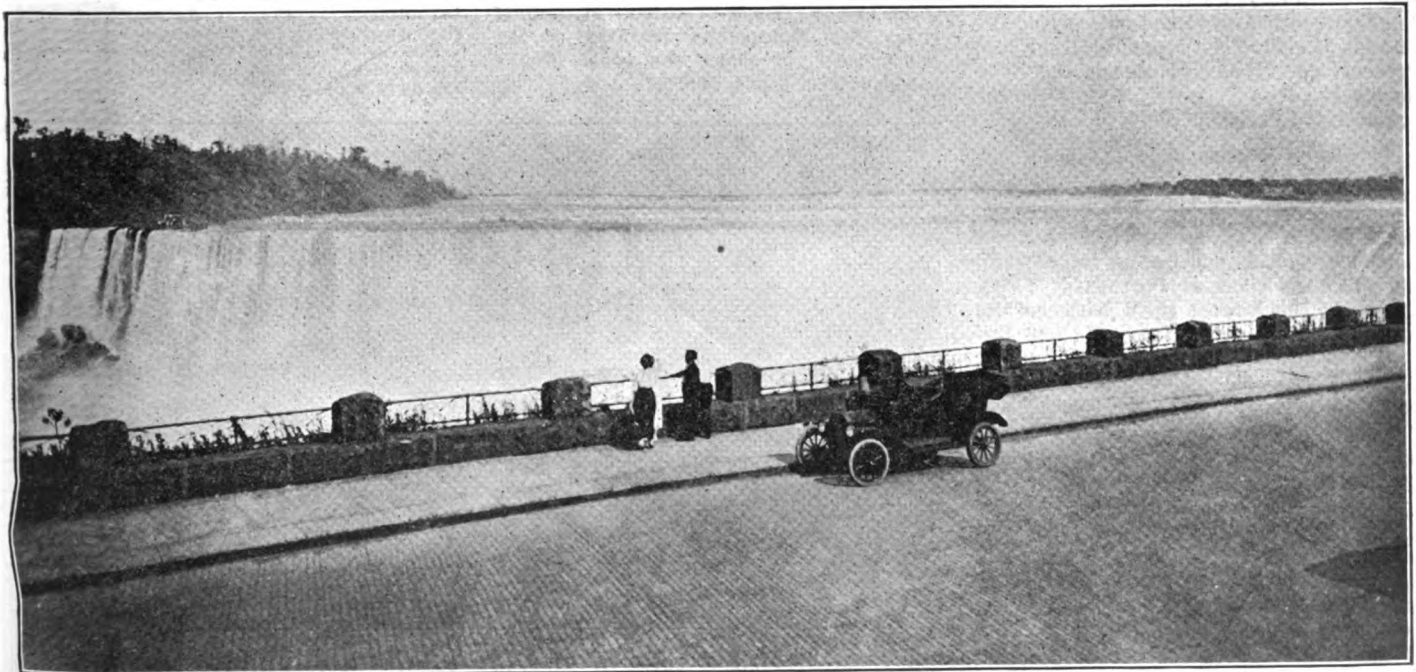
### How the Dominion May Be Entered.

The entrance to Canada may be made by any one of a considerable number of points, either in Maine, Vermont or New York, to best suit the location or taste of the individual. One of the most picturesque tours, in that it includes the great Maine woods, the French section of Canada and along the St. Lawrence and coming to a close in the Lake Champlain and Lake St. George region of New York, is a five-day journey starting at

Portland, Me., and proceeding through Augusta, the state capital to Quebec and up the river to Montreal; thence southeast to the Champlain and Lake George country. This is an extremely interesting trip, through a country of delightful variety. The roads are improved and the route is perhaps one of the best by which to enter Canada.

After enjoying some of the most magnificent seashore scenery in the country in the vicinity of Portland, the route turns north to Augusta; thence after proceeding up the picturesque Kennebec river valley for a few miles it plunges almost directly into the dense forests, where hunting and fishing are the chief attractions in their respective seasons. Once across the Canadian line the tourist finds himself in the delightful rural and farm section of Quebec, the home of the quaint French habitant. Some very fine views of the Chaudiere valley and of the Laurentian mountains in the distance are obtainable.

Quebec itself is a city of great beauty



Niagara Falls from the Canadian Side. (Courtesy Grand Trunk Railway System.)



The Citadel, City of Quebec, from River. (Courtesy Grand Trunk Railway System.)

and historical significance. It is known as the Gibraltar of America and is situated at the confluence of the St. Charles and St. Lawrence rivers. For many years it was the second city in size in Canada, but it has now been far outstripped in that respect by Toronto and Winnipeg and some others of the more recently settled cities. Quebec is built nearly in the shape of a triangle, abutting on the two rivers and the Plains of Abraham. It is divided into the upper and lower towns. The latter is very old, walled and fortified, and standing on a bluff 350 feet above the river. Dufferin Terrace is one of its show points, being the site of the old Chateau St. Louis, which was built by Champlain in 1620, and which served as a fortress, prison and governor's palace until it was ruined by fire in 1834.

The lower town, with its twisting streets and wharves, is in the immediate foreground, while below is the beautiful Isle of Orleans, and beyond are the bold peaks of the Laurentian range, with Cap Tourmente towering over the river in the distance. Among the other points worth the tourist's attention here are the Anglican cathedral, St. Louis gate, the Citadel, the St. John's palace, Hope and Prescott gates, Market square, the Seminary, Laval university, the Ursuline convent and the Parliament house.

#### From Quebec to Montreal.

From Quebec the road to Montreal lies along the North shore of the St. Lawrence all the way, crossing the Jacques Cartier river, famous for its salmon and the St. Anne river at Portneuf. Three Rivers is the largest town between the two cities. It was built in 1634 and lies at the mouth of the St. Maurice river, at the head of the tidewater on the St. Lawrence.

Montreal is the largest and one of the most interesting cities of Canada. It was settled by the French early in the 17th century. It was assaulted many times by the Indians, by the English, and twice unsuccessfully by an American army. The city is situated on an island at the confluence of the St. Lawrence and Ottawa rivers, the island having an area of 197 square miles. Three-fourths of the population are French. Although Montreal is several hundred miles from the

sea, it is the largest port in point of importations in Canada.

Another route to Quebec is from Newport, Vt. Burlington, Vt., is a convenient point of departure from the States to Montreal, while from Malone, N. Y., one can conveniently reach that city via Rouse's Point, N. Y. Or the tourist can cross the St. Lawrence river at Ogdensburg, N. Y., to Prescott, Ont., and proceed north to Ottawa, or west to Kingston, Cobourg and Toronto.

One of the most picturesque entrances to Ontario is to cross from Niagara Falls, N. Y., thence proceeding northwest to Hamilton, Ont.; thence eastward to Toronto, from which point the itinerary may be reversed to Cobourg, Kingston, Ottawa, Montreal and Quebec.

#### To Enter Maritime Canada.

Probably the most convenient route by which to enter maritime Canada is by the way of Bangor, Me., to Fredericton N. B., or via Calais, Me., to St. John, N. B. In this section may be made delightful trips to occupy a number of weeks if the tourist is inclined to revel amid pastoral scenes such as are afforded by Acadia and the Basin of Minas; or he may enjoy the picturesque features of the fishing villages along the coast of the peninsular of Nova Scotia.

This is truly a region of allurements for the summer visitor and is, as yet, comparatively free from many of the annoyances of the more crowded and frequently toured sections of Canada.

The tourist, in crossing into Canada, should not fail, on arriving at the last town, before passing over the boundary, to stop at customs headquarters for exportation papers, touring permit, and to comply with all inspection and other required formalities. A United States customs house will be found at all the principal places near the international line.

On returning to the States the same procedure will be necessary on the Canadian side.

#### ITINERARIES.

##### Portland-Augusta, Me., 64.8 Miles.

Miles	Miles
Portland, Me. . . 0.0	Auburn . . . . . 33.5
Morrill's Corn'r . 3.1	Lewiston . . . . . 33.9
Allen's Corner . . 4.0	Greene . . . . . 41.9
Gray . . . . . 17.1	Winthrop . . . . . 54.4
North Gray . . . 19.5	Manchester . . . . 60.3
Upper Gloucester 24.8	Augusta . . . . . 64.8

##### Augusta-Lake Parlin, Me., 97 Miles.

Miles	Miles
Augusta, Me. . . 0.0	Solon . . . . . 50.1
Waterville . . . 19.6	Bingham . . . . . 58.6
Fairfield Cen. . . 23.7	Carratunk . . . . . 73.9
Skowhegan . . . 36.0	The Forks . . . . . 81.3
Lakewood . . . . 41.7	Lake Parlin . . . . 97.0

##### Lake Parlin, Me.-Quebec, P. Q., 121 Miles.

Miles	Miles
Lake P'lin, Me. . 0.0	Des Plantes . . . . 71.4
Jackman . . . . 12.7	St. Joseph . . . . . 77.8
Moose River . . . 14.2	Beauce Junction . . 83.1
Line House . . . 28.4	St. Marie . . . . . 90.1
Armstr'g, P. Q. . 39.4	Scott Junction . . . 95.2
Jersey . . . . . 56.1	St. Henri . . . . . 100.9
St. George . . . . 58.0	Levis-Que. Fer. . . 120.6
Gilbert . . . . . 65.0	Quebec . . . . . 121.0
Beauceville . . . 67.9	

##### Quebec-Montreal, P. Q., 176.7 Miles.

Miles	Miles
Quebec, P. Q. . . 0.0	Three Rivers . . . . 79.6
St. Augustin . . . 14.3	Pointe du Lac . . . 88.7
Les Escureuils . . 28.5	Yamachiche . . . . 97.0
Cap Sante . . . . 32.7	Maskinonge . . . . 111.1
Portneuf . . . . . 37.8	Berthier . . . . . 125.3
Deschambault . . 42.0	Lanoraie . . . . . 134.5
La Chevrotiere . . 46.8	Lavaltrie . . . . . 140.6
Grondines . . . . 49.1	St. Sulpice . . . . . 146.3
Ste. Anne de la . .	L'Assomption . . . 151.5
Parade . . . . . 57.9	Charlemagne . . . . 160.2
Champlain . . . . 66.0	Montreal . . . . . 176.7
Cp de la MT'line . 75.7	



Montreal from Mount Royal, Grand Trunk Victoria Jubilee Bridge Across the St. Lawrence in the Distance. Royal Victoria Hospital in the Foreground. (Courtesy Grand Trunk Railway System.)



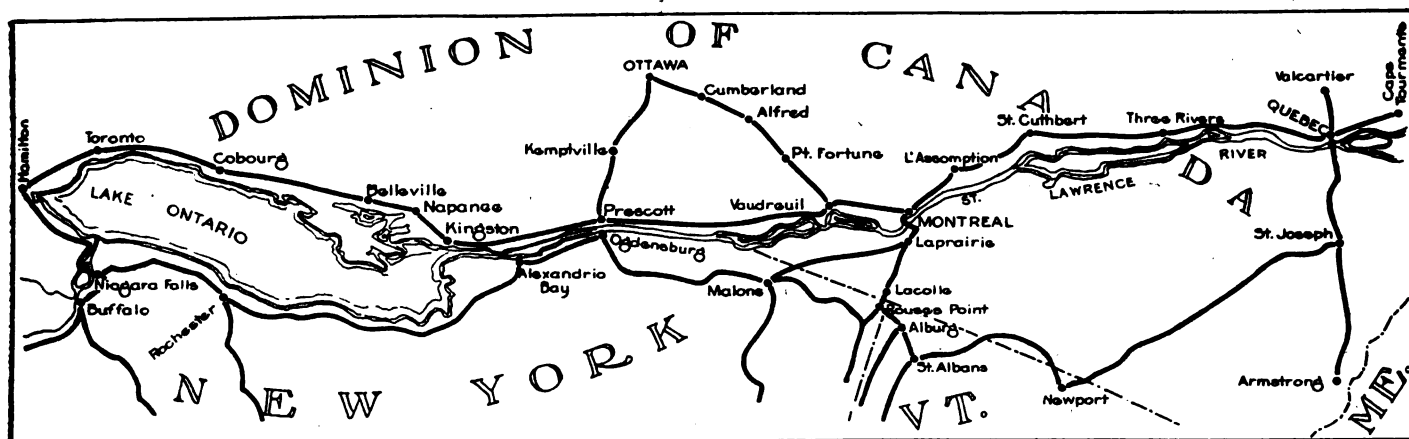


Chart of Route Encircling Lake Ontario and the Upper St. Lawrence Valley.

## Newport, Vt.-Quebec, P. Q., 177.8 Miles.

Miles.	Miles.
Newport, Vt. 0.0	Coleraine 97.5
Derby 5.1	Thetford Mines 108.2
Stanstead, P. Q. 11.0	Robertson Sta. 113.4
Cassville 17.1	Reedham 115.3
Massawippi 29.5	Kinnear's Mills 123.8
Lennoxville 39.7	Leeds 130.0
Ascot 55.2	Parkhurst 139.8
S. Dudswell 57.4	St. Giles 148.4
Marbleton 66.8	St. Etienne 160.3
Weeden 75.7	Chaudiere 165.6
Garthby 86.6	Levis 173.5
D'Iraell 91.7	Quebec 177.8

## Montreal-Ottawa, Can.

Miles.	Miles.
Montreal 0.0	Hawkesbury 61.9
St. Laurent 6.9	Lorignal 65.0
Borde a Plouffe 11.6	Cassaburn 67.5
St. Martin 12.6	Alfred 77.5
St. Eustace 20.5	Plantagenet 84.5
St. Benoit 31.8	Wendover 90.5
St. Placide 38.2	Clarence 96.0
St. Andrew's E. 46.6	Rockland 98.5
Carrillon (Fry) 48.9	Cumberland 103.5
Point Fortune 49.0	Orleans 110.5
Little Rideau 54.2	Ottawa 121.0

## Montreal, P. Q.-Kingston, Ont.

Miles.	Miles.
Montreal 0.0	Morrisburg 107.1
Lachine 7.4	Iroquois 115.1

St. Anne's (Fry) 23.1	Cardinal 120.5
Ile Perrot (m'land Fry) 30.5	Prescott 130.0
Cascade Point 33.1	Brockville 142.2
Lancaster 63.4	Lyn Village 148.5
Cornwall 80.2	Gananoque 175.8
Aultsville 98.2	Kingston 194.4

## Kingston-Toronto, Ont.

Miles.	Miles.
Kingston 0.0	Coburg 93.8
Catarqui 3.6	Port Hope 101.2
Napanee 25.5	Bowmanville 122.8
Marysville 33.9	Oshawa 132.2
Shannonville 40.6	Whitby 136.4
Belleville 49.4	Pickering 142.5
Trenton 60.7	Toronto 165.0
Colborne 78.4	

## Toronto-Hamilton, Ont.

Miles.	Miles.
Toronto 0.0	Freeman 38.8
Cookville 16.3	Aldershot 41.6
Trafalgar VII. 24.7	Hamilton 47.0
Appleby 35.0	

## Calais, Me.-St. John, N. B., 81.9 Miles.

Miles.	Miles.
Calais, Me. 0.0	Musquash 64.3
St. Steph., N. B. 0.4	Spruce L. Sta. 74.0
Oak Bay 7.0	Fairville 78.0
St. George 35.8	St. John 81.9
Lepreaux 55.7	

## Houlton, Me.-Woodstock, N. B., 14.7 Miles.

Miles.	Miles.
Houlton, Me. 0.0	Woodstock, N. B. 14.7
Richmond Cor. 7.8	

## Woodstock-Fredericton, N. B., 63.4 Miles.

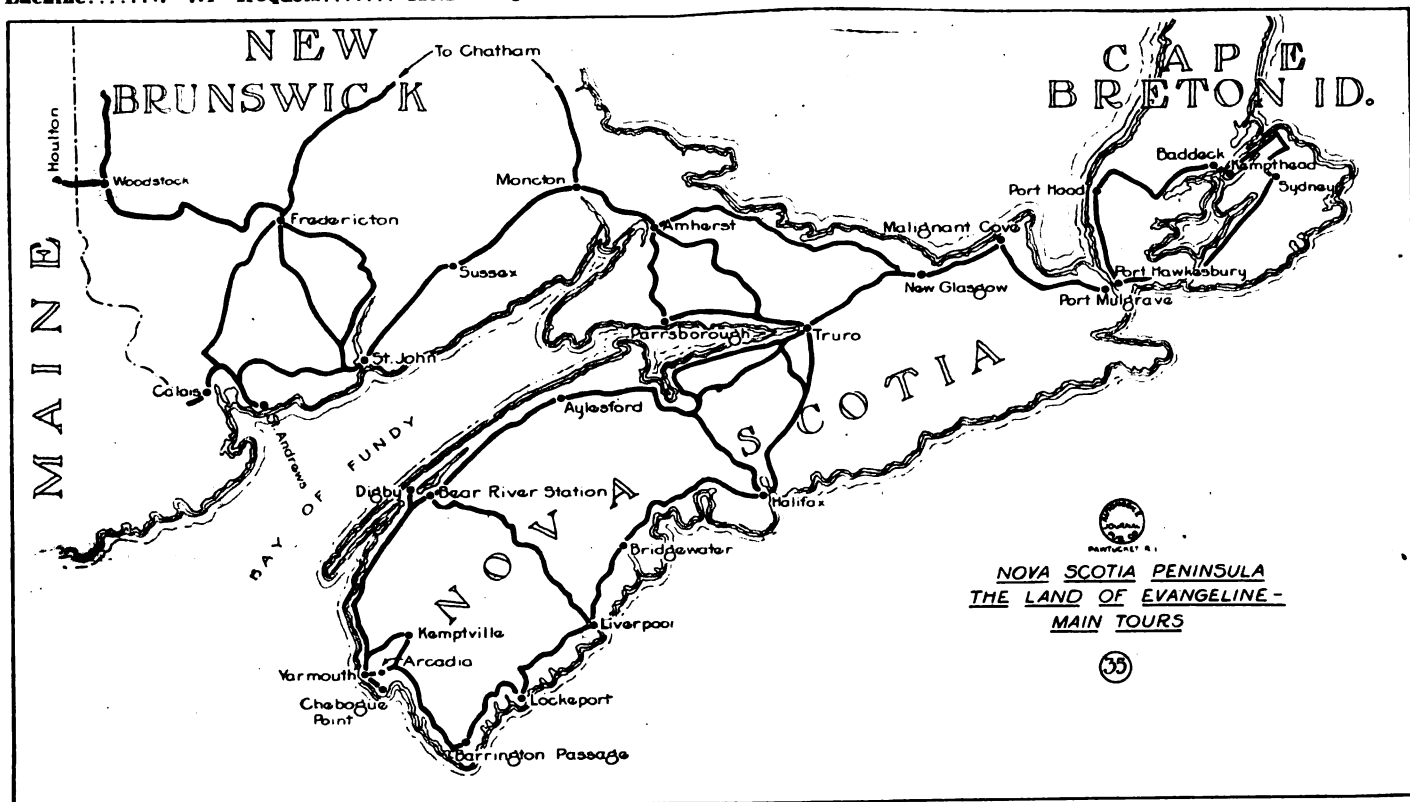
Miles.	Miles.
Woodstock, N. B. 0.0	Prince William 41.5
Meductic 12.8	Hammondville 47.2
Hawshaw 26.3	Fredericton 63.4

## St. John-Fredericton, N. B., 66.6 Miles.

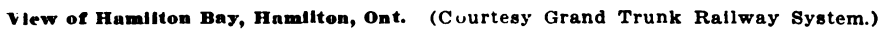
Miles.	Miles.
St. John, N. B. 0.0	Welsford 24.7
Fairville 2.9	Petersville 33.2
Grand Bay 10.5	Oromocto 54.2
Westfield B'ch 14.5	Fredericton 66.6

## St. John, N. B.-Amherst, N. S., 132.8 Miles.

Miles.	Miles.
St. John, N. B. 0.0	Pettitcodiac 68.7
Brookeville 4.7	River Glade 73.9
Terburn Sta. 5.8	Salisbury 78.8
Riverside Sta. 7.4	Boundary Creek 82.1
Rothsay 8.9	Moncton 92.8
Nauwigewank 17.0	St. Anselme 96.8
Lakeside Sta. 20.9	Memramcook 104.3



NOVA SCOTIA PENINSULA  
THE LAND OF EVANGELINE -  
MAIN TOURS



**Amherst-Truro, N. S., 74.9 Miles.**  
(Via Wentworth Valley.)

**Amherst-New Glasgow, N. S., 97.2  
Miles.**

**Amherst-Truro, N. S., 92.4 Miles.**  
(Via Parrsboro.)

**Truro-New Glasgow, N. S., 40.6  
Miles.**

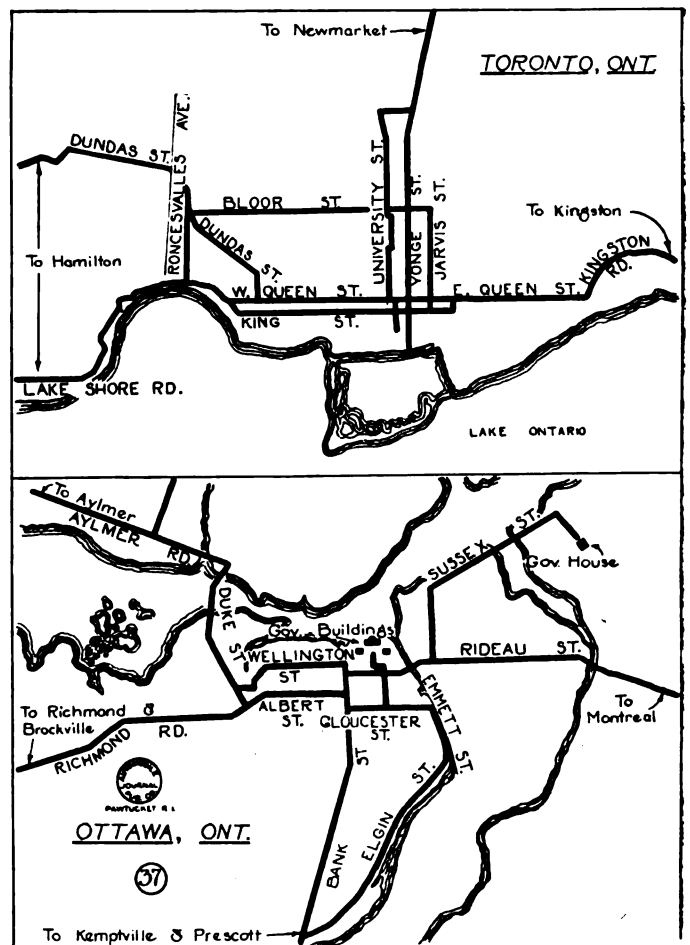
	Miles		Miles
Truro, N. S. . . .	0.0	Green Hill . . . .	81.3

**Truro-Halifax, N. S., 65 Miles.**

**Halifax-Digby, N. S., 152 Miles.**

**Digby-Yarmouth, N. S., 66.5 Miles.**

	Miles		Miles
Digby, N. S. . . .	0.0	Saulnierville . . .	34.1
Barton . . . . .	9.0	Low, Sauln'ville .	35.2
Plympton . . . .	12.0	Meteghan River .	37.0
Gilbert Cove . .	13.9	Meteghan . . . . .	39.5
Ashmore . . . . .	15.8	Mavlette . . . . .	46.2
Weymouth N. . .	18.1	Salmon River . . .	48.9
Weymouth . . . .	19.9	Beaver River . . .	52.4
Belliveau . . . .	24.6	Port Maitland . .	55.0
Church Point . .	28.3	Hebron . . . . .	62.4
Little Brook . .	31.0	Yarmouth . . . . .	66.5
Comeauville . . .	32.0		

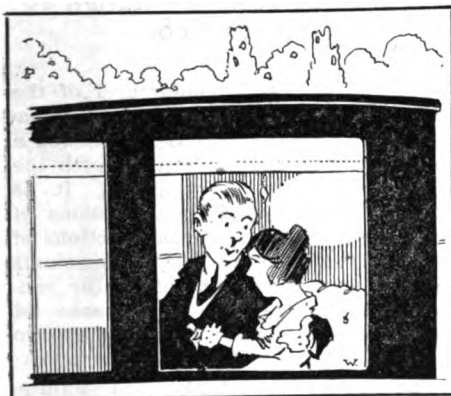




# HUMOROUS SIDE OF MOTORING

## METHOD IN HIS SOLICITUDE.

The chauffeur was speeding the car along at a great rate. And He and She were nestled coyly in the back seat. After



a long silence he said:

"Are you quite comfortable, dear?"  
 "Yes, love."  
 "The cushions are cozy and soft?"  
 "Yes, darling."  
 "You don't feel any jolts?"  
 "No, sweetest one."  
 "And there is no draft on your back?"  
 "No, my ownest own."  
 "Then change seats with me."—Princeton Tiger.

## BETTER BUY A FLIVVER.

Chug-Chug! br-r! br-r-r! Honk! Honk! Gilligillug—gilligillug.

The pedestrian paused at the intersection of two streets. He looked about. A motor car was rushing at him from one direction, a motorcycle from another, a steam truck was coming from behind and a taxicab was speedily approaching. Zip-zip! Zing-glug!

He looked up and saw directly above him an airship in rapid descent.

There was but one chance for the poor man. He was standing upon a manhole cover. Quickly seizing it, he lifted the lid and jumped into the hole just in time to be run over by an underground train. —Los Angeles Times.

## ALWAYS THE SAME FINISH.

"Yes," said the prospective buyer, "I always judge a motor car by its engine."

"But don't you pay any attention to its finish," asked the salesman, who had been making selling points of his car's upholstery and trimmings.

"Never! My cars always have the same finish—a brick wall or a ditch."

## REAR-END COLLISION.

"I hear that lightning struck Speeder's big new automobile."

"Well, Speeder claims it was his automobile that struck the lightning."

## ANOTHER RECORD BROKEN.

Powell & Justus, contractors at Punxsutawney, Pa., bought a motor truck at 10 o'clock in the morning, received it at 11 o'clock, paid the premium on an accident insurance policy at 12 o'clock, started the truck for Indiana at 12:30 o'clock and got a telephone message at 2 o'clock from the driver saying that in trying to avoid a collision with another machine he had crashed into a street car and the new truck was a complete wreck.

## DANGEROUS BEASTS.

The teacher had been telling her class about the rhinoceros family. "Now name some things," she said, "that are very dangerous to get near to, and that have horns."

"Automobiles!" promptly answered Johnny.



WELL!! WELL!!

He—My clutch is awful weak.

She—So I've noticed.—Cornell Widow.

## VERSATILITY WORTH WHILE.

The recent marriage of Senorita Rose Chargood, daughter of a Brazilian millionaire, and Joseph Andrews Brooks of Brooklyn, N. Y., a former captain in the American Aviation Corps, was the culmination of a romance which began a few weeks previous on a Long Island automobile road.

Senorita Chargood, after waiting six hours for her chauffeur to adjust her automobile, which had broken down in the road, was helped out of her predicament by Mr. Brooks. He is a versatile linguist and spoke to the senorita in her native tongue, telling her how easily the trouble could be adjusted, and proceeded to fix her car, which he had in running order in a few minutes.

## HOW THEY HANDLE AUTO TRAFFIC IN JAPAN.

A Japanese officer of the Kasuga, which came 11,000 miles to take part in the celebration at this harbor, gave me this list of the auto traffic rules of Japan, his translation being, as you can see, a rather free one:

In narrow place of road corner and bridge speed slowly.

When you pass the corner and the bridge ring the horn.

When you meet the cow or the horse speed slowly and take the care to ring the horn.

When you cross the railway, wait until the other cars pass through.

When a passenger of the foot hove in sight, tootle the horn trumpet at him melodiously at first. Then if he still obstructs your presence, tootle him with vigor and express by word of the mouth by warning "Hi!"

When anything the matter with your car you go to police station and tell him.

When two cars are driving in the same road, if there is another car behind yours or ahead of yours, you must keep 60 yards away. He must do the same. If you go ahead of him, ring horn and pass by him.—The Stroller in Portland, Me., Evening Express-Advertiser.

## WHY DID THEY LEAVE THE CAR?

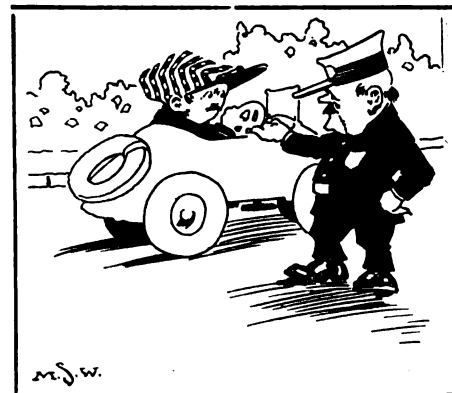
An Illinois man advertises in his local paper as follows: "I will give \$200 reward for the arrest and conviction of the party or parties who broke into my garage and robbed my 1920 Ford touring car of top, curtains, wheels, cushions, carpets, floor boards, engine hood, radiator cap and tools."

## SURE TO GET HIM.

"You're under arrest," exclaimed the officer, as he stopped the automobile.

"What for?" inquired Mr. Chuggins.

"I haven't made up my mind yet. I'll

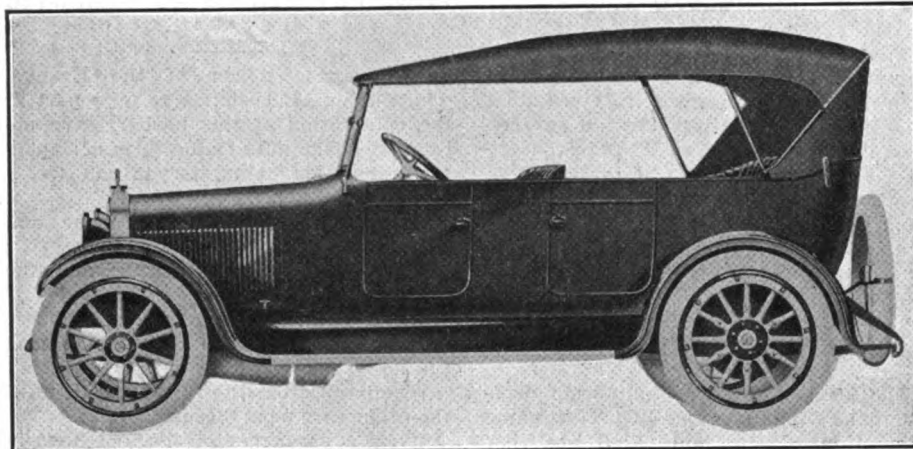


just look over your lights, an' your license, an' your numbers, an' so forth. I know I can get you for something." —Ex.

## New Car Offered by Globe Motors Co.

A FINE example of the advance in the design, construction and refinement made in recent years in four-cylinder cars is afforded by the Globe Four, which has just been an-

Rims—Firestone.  
Tires—32x4 Firestone, oversize cord.  
Springs—Specially designed, extra wide; front spring, 36 inches long, 2½ inches wide; rear spring, 54 inches long, 2½ inches wide.  
Frame—Extra heavy, seven-inch chan-



New Globe Four Car to Be Made in Five-Passenger Touring Car and Two-Passenger Roadster Models by Globe Motors Co., Cleveland, O.

nounced by the Globe Motors Co., Cleveland, O. This new car is reported as having a special appeal to the business man in that it combines medium size, facility of handling and economy of operation, with genuine comfort and distinctive appearance.

The president of the Globe Motors Co., Charles H. Davies, states that the underlying purpose of the Globe Four was to build a car that, regardless of price, would meet the well defined demand for distinctive quality and of a size convenient for general, everyday use. Mr. Davies is well known in the automobile industry as the founder of the Supreme Motors Corporation, with which he was officially connected as vice president and general manager.

The Globe Motors Co. states that it will commence the production of the Globe Four car on a quantity basis about Oct. 1 and that distribution arrangements have already been completed for more than its production.

Following are the detailed specifications:

Engine—"Supreme" four-cylinder, cast en bloc, 3½ inch bore by five inch stroke; "L"-head type, force lubrication; crankshaft of special design with three large bearings; engine develops 39½ horsepower at 2200 revolutions per minute.

Ignition—Delco system.

Starting and lighting—Delco.

Clutch—Borg & Beck.

Transmission—Special Warren; three speeds forward and reverse.

Steering gear—Gemmer full worm and sector with 17-inch corrugated steering wheel.

Axles—Eaton front and rear; Bock bearings used throughout. Rear axle equipped with 14-inch brake drums, 2½ inches wide, on which the service brake is mounted. Emergency brake is mounted on transmission.

Radiator—Special honeycomb, hexagon type; core made of United States cartridge copper tubing; non-destructible; shell, nickel plated or enamel.

Windshield—Specially designed, exceptionally strong; top half overlapping lower half.

Wheels—Wood of selected natural hickory, artillery type.

nel with double drop.

Body—Five-passenger touring; two-passenger roadster with extra large carrying space accessible from the sides.

Top—Extra heavy "Never-Leak;" side curtains contained in compartment back of front seat, readily accessible.

Instrument board—Black walnut.

Finish—Holland blue; natural wood wheels, or English vermillion red wheels.

Wheelbase—115 inches.

Upholstery—Finest quality, first cut leather; Marshall springs.

Equipment—Electric motor driven horn, speedometer, motometer, extra tire and tube, tire repair kit, jack and tools.

### LAUREL EQUIPMENT IDEAL FOR HUNTING COYOTES.

The accompanying illustration shows Roy L. Campbell of Kimball, Neb., and his Ford speedster, which he has equipped especially for engaging in the sport of hunting coyotes. This speedster is fitted with a Roof 16 overhead valve, manufactured by the Laurels Motor Car Corporation, Anderson, Ind.

It is great sport, as Mr. Campbell describes it, to engage in one of these hunts wherein the coyotes are driven to

the open and are then pursued in the speedster and are overtaken with ease. It is claimed that he has killed 121 of the animals in a short time, and that his success is due to the speed he can attain with his Ford speedster equipped, as above described, with a Roof 16 overhead valve, and if a few more owners of cars could be prevailed upon to enter into this sport it would not be long before that section of the West would be free from the coyote nuisance.

### ATTRACTIVE BOOKLET ISSUED BY BARRETT CO.

The Barrett Co., manufacturer of the well known Tarvia road surfacing material and similar products, has issued a very attractive booklet setting forth the special uses for Tarvia, etc. It is superbly illustrated by reproductions of photographs taken in various sections of the country where the Tarvia compounds have so greatly contributed to the construction and proper maintenance of highways. The treatise is subdivided into sections devoted to the following topics:

"Tarvia for the Repair and Maintenance of Concrete;" "Surface Coats on Concrete;" "The Repair and Maintenance of Bituminous Macadam and Other Bituminous Surfaces;" "Repair and Maintenance of Macadam Surfaces;" "The Use of Tarvia Over Worn Brick Pavement;" "Tarvia for Shoulders;" "Cold Patching with 'Tarvia-KP';" "Protective Surfaces on Plank Bridge Floors;" "Treatment of Wood Block Pavements with 'Tarvia-B';" "Tarvia Bound Bases;" "Treatment of Slippery Pavements with 'Tarvia-B' and Sand;" "Treatment of Walks and Pathways in Parks, Cemeteries and Private Estates with Tarvia;" "Treatment of Adobe Gravel and Shell Roads;" "Tarvia for Gutters and Waterways;" "Tarvia on Gravel Roads;" and "Tarvia Service Department."

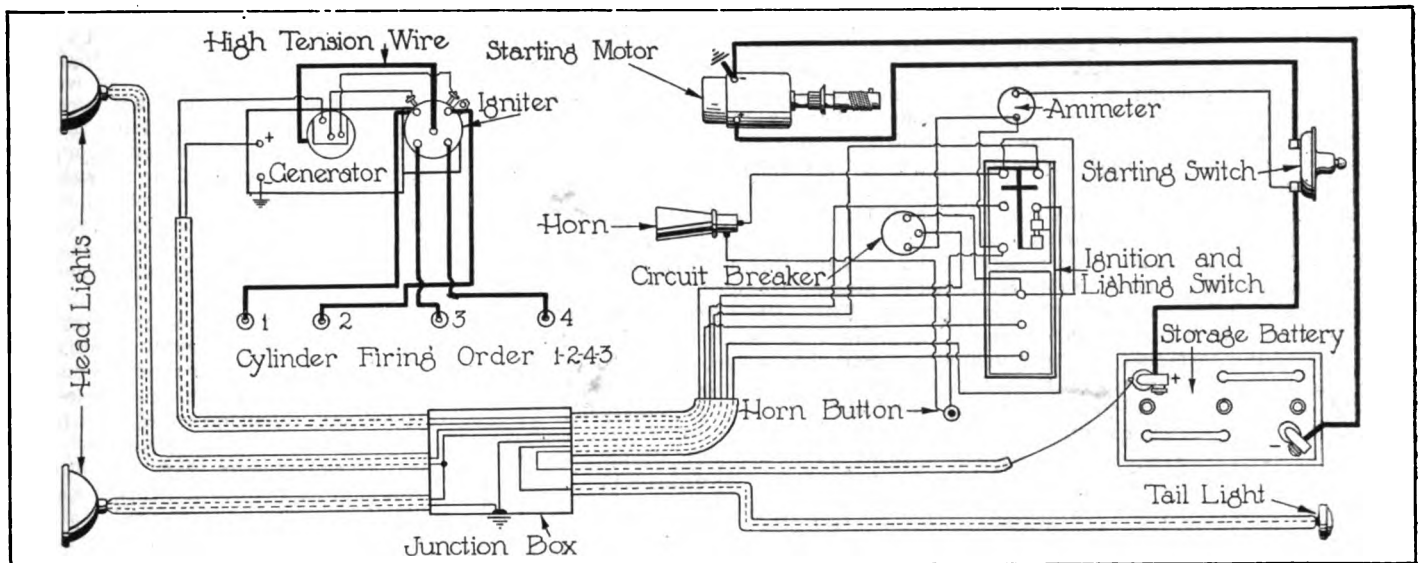
A separate brochure is issued devoted to "Barrett Paving Pitch and Tarvia MF for Brick, Wood Block and Granite Block Pavements."

The Barrett Co. maintains headquarters in some 42 of the principal cities of the United States and Canada, from which all sections of the continent are promptly and efficiently served.

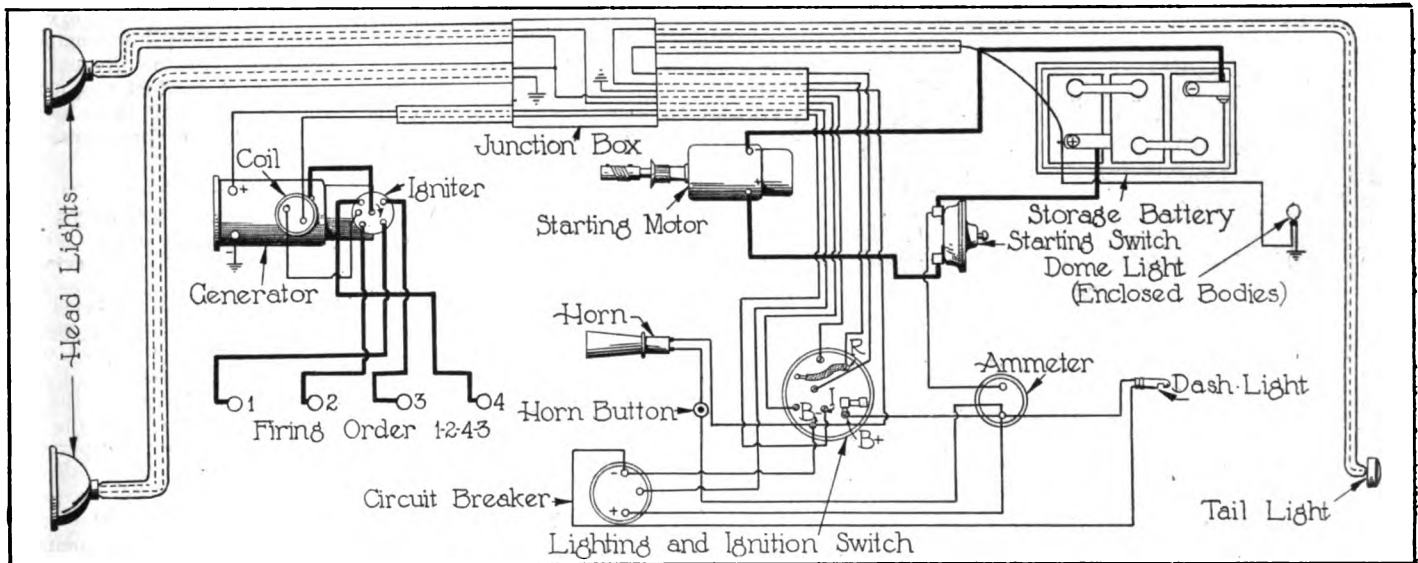


Roy L. Campbell of Kimball, Neb., and His Ford Speedster Especially Fitted with Laurel Roof 16 Overhead Valve for Hunting Coyotes.

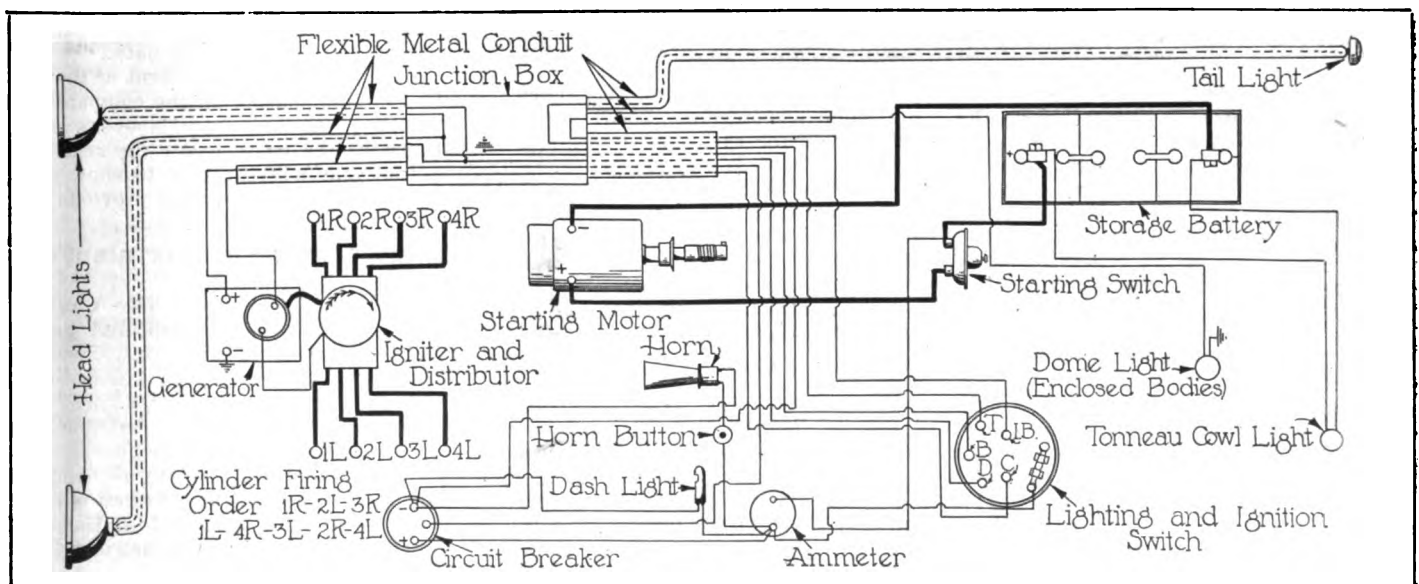
# Monthly Wiring Diagram, No. 6



**Chevrolet 490, Four Cylinders, Auto-Lite Starting and Lighting, One-Wire System.**



**Chevrolet Model F, Four Cylinders, Auto-Lite Starting and Lighting, One-Wire System.**



**Chevrolet Model D, Eight Cylinders, Auto-Lite Starting and Lighting, One-Wire System.**



## REASONS FOR NO DOWNWARD TREND IN TIRE PRICES

CAREFUL analysis of the rubber tire manufacturing business does not indicate a downward trend of tire prices, according to expert business analysts. Their opinion is based upon the comparative increase in price of practically all commodities within the past six years, and the fact that automobile tires are today nearer their pre-war level of prices than nearly every other staple article upon the American market. The basic factor in drawing the conclusion that tire prices will remain stable while prices of many other articles may be expected to drop with further deflation of currency, is the fact that the consumer now is paying only 41 per cent. more for tires than in 1914, over 113 per cent. more for fuel and light, 267 per cent. more for sugar, and 231 per cent. more for household furnishings, with commensurate percentages of increase holding good in the

er durability of the highly perfected tire today. Six years ago a 4000-mile tire was unusual. Today an 8000-mile tire performance is a very ordinary record. Figuring conservatively upon this mileage basis alone, a 1920 tire will deliver at least 100 per cent. more mileage than did a 1914 tire, and yet costs but 37 per cent. more. The tire selling for \$50 in 1914 cost  $1\frac{1}{4}$  cents a mile, based on 4000 miles of service. The same tire now gives at least twice the mileage and costs only \$70, making the cost a mile only  $\frac{7}{8}$  of a cent. This means that the same mileage actually is being purchased today for 30 per cent. less money.

This improvement in the 1920 tire over the 1914 tire, it is pointed out, even is more marked in a comparison of the 1910 tire with that of today, the average mileage today being fully three times that of a 1910 tire. Motorists in 1910 paid \$35.65

mitted greater manufacturing economy, overhead reduction and the marketing of the finished tire at a lower cost to the consumer.

Were conditions normal and were the purchasing value of the dollar not cut practically in two, prevalent tire prices might not be considered so unusual. But when it is taken into consideration that wages, freight rates, food prices, the cost of cotton and the various compounding ingredients used in the manufacture of tires, have soared and in nearly all cases more than doubled, the fact that automobile tires are of better quality and yet are selling for less than they did 10 years ago, constitutes a refreshing thought and a decided relief from the incessant reminder of the high cost of living. Since August, 1914, the price of cotton has jumped from 20 cents a pound to \$1.35 a pound, an increase of 575 per cent. The manufacturing cost of cotton fabric for automobile tires has increased 190 per cent., while the cost of compounding ingredients has increased approximately 68 per cent. The price of crude rubber today is unusually low, compared to other materials, but the present low level in price does not affect tire prices, due to the fact that vast quantities of rubber were contracted for before the break in price.

### AJAX RUBBER CO. REPORTS INCREASED BUSINESS.

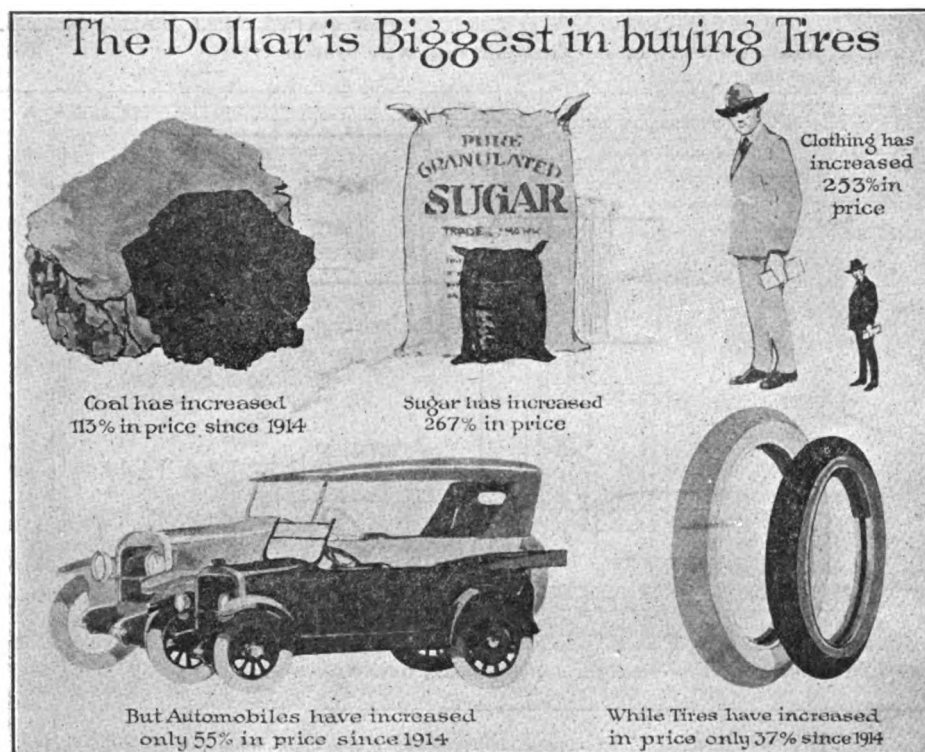
The business of the Ajax Rubber Co., Inc., New York city, for the six months ending June 30, 1920, is reported to be greater in volume than for any similar period in any previous year in the history of the company, exceeding the first six months of 1919 by about 16 per cent. And it is also stated that a sufficient profit was earned during the period to provide for the dividend for the entire year 1920, two quarterly payments of which have already been made, and in addition to add a substantial amount to the surplus account which, on June 30, was shown to be \$3,000,000 after deducting all dividends paid to date.

Horace DeLisser, president of the Ajax Co., in commenting on the company's activities, said that there is every indication that the business for the remainder of the year will continue to show an increase in volume over any previous year.

### ARMSTRONG TIRE DISTRIBUTOR.

The Texas Armstrong Tire Co., capitalized at \$20,000, and officered and directed by Fort Worth, Tex., men, has opened its main office at the corner of 14th and Houston streets, that city. This company will be the sole distributor, in Texas, Louisiana, New Mexico, Arizona, Oklahoma and southwestern Arkansas, for the products of the Armstrong Rubber Co., Garfield, N. J. E. S. Hooper is president of the Texas Armstrong Co.

Welch-Kelly Tire Co. has sales rights on Mason tires in Kansas City.



prices of practically all other commodities. These figures are compiled by the United States Department of Labor.

The sudden curve back from the peak of high prices, precipitated by currency deflation and restriction of credit, unquestionably has led many motorists to anticipate a drop in tire prices, and consequently has caused many to delay contemplated purchases until the drop could come. But the already comparatively low price of tires at this time precludes such a downward trend, it is stated. Hence it is argued that while the American public may be justified in waiting for prices of certain commodities, which now are selling at better than 100 per cent. advance over 1914, to decline, there is nothing to justify a similar decrease in prices of tires.

#### Added Mileage and Greater Durability.

Another important factor in the tire situation is the added mileage and great-

er durability of the highly perfected tire today. Six years ago a 4000-mile tire was unusual. Today an 8000-mile tire performance is a very ordinary record. Figuring conservatively upon this mileage basis alone, a 1920 tire will deliver at least 100 per cent. more mileage than did a 1914 tire, and yet costs but 37 per cent. more. The tire selling for \$50 in 1914 cost  $1\frac{1}{4}$  cents a mile, based on 4000 miles of service. The same tire now gives at least twice the mileage and costs only \$70, making the cost a mile only  $\frac{7}{8}$  of a cent. This means that the same mileage actually is being purchased today for 30 per cent. less money.

#### Elements Which Are Responsible.

There are several elements directly responsible for this condition. Principal among them is the improved method of manufacturing automobile tires, of raising and curing rubber and of making cotton tire fabric, all made possible through long experience, careful research work and the invention of more modern machinery.

Secondly, quantity production has per-

### COMPLYING WITH HEADLIGHT LAWS.

Headlight dimming laws vary in different states, although compulsory in many of the eastern states at the present time, and being first adopted by western states. One way to meet requirements that is not costly, is the following: Purchase a few cents worth of Epsom salts, dissolve in about five ounces of water and flow the liquid over the inside of the lens. When dry it forms a frosting similar to ground glass. Another way is to purchase a so-called ground glass substitute from a photographic supply house and pour this on the inner side of the lens, letting it flow so as to distribute it evenly. One treatment is good for a whole season.

Still another suggestion is to paste on the inner side of the lens a piece of paper with a two-inch hole in the center. When dry, flow ground-glass substitute on the unpapered center. Let dry and soak off the paper in cold water. This treatment leaves plenty of light, with direct glare eliminated.

### SEASONABLE RIM ADVICE.

When placing rims upon the wheels, start all the bolts evenly; then gradually tighten alternate bolts on opposite sides of the wheel, giving each a few turns so that, when the rim lugs are tight, they will all be wedged in at equal distances.

Avoid scraping the curb stone; this strains the wheels and causes loose spokes, bent rim bolts and creaking wheels.

Tighten the nuts on the inside of the wheel around the hub flange—this need be done only after long periods of use.

Keep the tires inflated to the proper pressure, according to the information molded on sides of tires.

If the rim lugs have become worn so that they do not wedge the rim tightly, new ones should be provided at once.

Finally, do not permit the driving wheels to slide either in starting or stopping. Gradual clutch and brake engagement will avoid this. Proper adjustment of each and good judgment in driving will amply repay.

### USE SOAP TO STOP GASOLINE PIPE LEAK.

Comparatively few motorists know the value of soap for sealing leaky joints in the gasoline system. Very frequently gasoline oozes out around the filler cap of the main tank, especially when the tank is nearly full. Such a leak is objectionable because the gasoline spreads over the outside of the tank, which in the later models of cars is usually carried at the rear of the car, collecting dust and otherwise impairing the finish. A coating of ordinary soap on the gasket and threads will prevent leakage, even when the tank is full. When joints in the fuel line and around the carburetor in particular, develop small leaks, a coating of soap will usually prove effective.

## Why It Pays to Buy Cord Tires

IS it worth the extra dollars to buy cord tires? This is a question which nearly every motorist weighs in his mind when the time comes to fit the car with new tires.

The cord tire will pay in the long run, the tire dealer or maker will tell you. In place of 5000 miles of service on fabric tires you will be promised from 8000 to 15,000 miles on cords and also, in many cases, a saving of from 15 to 20 per cent. on gasoline. These claims are based on the fact that, on account of the cord tire's improved construction, little or no energy is dissipated in internal friction and heat. Thus the tire is more durable and the rolling resistance of the car on the road is less, reducing fuel consumption per mile.

Cord tires offer several advantages in construction over fabric tires, the carcasses of which are built of 17½-ounce duck, close woven, and which is still in most common use among car owners. There is little difference in cord tires made by the different manufacturers. One type may have only two layers of heavy cord; other companies use a greater number of layers of finer cord.

Both fabric and cord tires are laid on a bias of 45 degrees. The fabric is less durable because each thread of the warp bends around the threads of the woof and, as the tire passes over the road, its tread is bent back and forth, straining the fabric threads and causing them to finally break.

In the cord tire all of the cords of one layer run parallel to each other, so that there is no bending of these threads, one over the other. The threads of the adjacent layers run at right angles to each other, but these layers are separated by a thin coat of pure rubber. The result of this construction is that the cord tire offers much less resistance in bending than does the fabric tire. In travelling over the road it will yield and snap back much faster. There is less heat generated in the cord than in the fabric tire, also, for the same reason. A car coasting down a hill on cord tires will coast farther than a car on fabric tires.

Another cord advantage is that it will carry a given load with less air pressure than a fabric tire. This item alone means something to the hundreds of thousands of motorists travelling about constantly with more or less under-inflated tires. Of course, it is bad practice to run with low air inflation even on cord tires. Also the advantages of lower fuel cost to the mile are lost.

A larger proportion than ever of new cars are coming out cord-equipped. These tires are of the best construction and are really over-sized, allowing air pressure to be reduced about 10 per cent., as a rule.

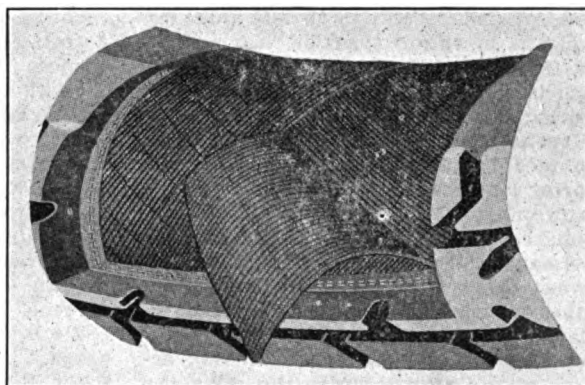
Smaller wheels are meeting with favor

for low-hung cars. The tire of smaller diameter is naturally less expensive. In former years the large wheel diameters made 34 by 4-inch tires very popular; now the 32 by 4-inch is very much in evidence, following European practice.

It must be remembered that if the cord tire is inflated to the same pressure as the fabric there is not much difference in their respective riding qualities. In fact, the cord tire is apt to rebound on the road much more. But when inflated 15 pounds less than the fabric tires, the riding qualities of the cord are noticeably superior.

Generally the ideal pressure for fabric tires is 17 times its cross-section diameter. That is, a three-inch tire should be inflated to about 51 pounds; a four-inch tire to 68 pounds. Bouncing tests for fabric and cord tires have shown that cords rebound 33 to 40 per cent. more than fabrics and that they keep on rebounding longer, this being on a car not heavily loaded.

All in all, however, the cord tire's longer life and its reduced rolling resist-



Section of Representative Type of Cord Tire Cut Away to Show Method of Construction.

ance make it an economical purchase for the motorist.

### PROTECT THE MUD GUARDS.

It is easy to scratch and smear the front mud guards with grease when doing work on the engine, and the motorist would do well to follow the example of the best garages in protecting the mud guards during engine repairs. Secure a heavy piece of cloth or other suitable material—oil cloth or imitation leather—large enough to completely cover the fender from the tip to the point where it attaches to the running board. Throw this protective covering over the mud guard when making repairs or adjustments under the hood and you will be able to keep enamel in better condition.

A further precaution to prevent the covering from scratching the finish of the mud guard is to line the covering material with cotton flannel or some other soft cloth that will not mar the finish. This inner covering can be easily stitched to the outer cover in such a manner that the two sections will be as one.

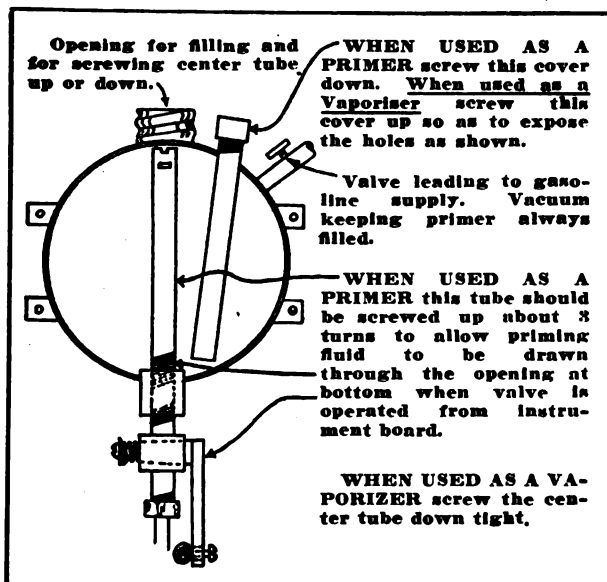
## Williams Heads Barco Battery Co.

P. B. Williams heads a corporation composed of automobile and storage battery men of Detroit for the manufacture of automobile storage batteries under the name of Barco Battery Co. The new product is called the Barco "Bearcat" battery. It is made in seven standardized models that fill the requirements of 99 per cent. of the electrically equipped automobiles in use. The plates in the Barco "Bearcat" are made by a special process which is claimed to result in the combination of extraordinary high momentary discharge, exceptionally efficient recharge, and tough, hard plate surface that enables the battery to stand up for an unusual length of time under the abuse to which automobile storage batteries are subjected. The battery is guaranteed for 18 months. The office and factory are located at 83 West Fort street, Detroit.

### THE BROWN SPRING OILER.

A satisfactory way to obviate annoying squeaks in spring shackles, leaves, etc., is to equip with Brown spring oilers, which are being marketed by the Brown Spring Oiler Co., 6911 Carnegie avenue, Cleveland, O., and are especially designed to feed the lubricant in between the spring leaves automatically while the car is running. This works out the rust and polishes the leaves. Brown spring oilers permanently maintain a film of oil between the spring leaves by feeding the lubricant continuously through the sides. Capillary attraction draws the oil between the leaves and the feathering action of the spring forces the oil along their entire length. A liberal supply of oil will quickly flush out the worst rust, it is claimed, and, with the rust gone, the leaves soon begin to polish themselves. In this condition the springs flex freely and carry their load smoothly.

The company also makes a special type of pump oil can, which is recommended for general oiling, at a list price of \$2.50.



P. B. Williams, Head of Barco Battery Co., Detroit, Mich.

### RANGER FOUR-PASSENGER CAR TO APPEAR IN SEPTEMBER.

The Southern Motor Manufacturing Associated, Ltd., Houston, Tex., announces that the Ranger four-passenger car will make its appearance on the market the latter part of September. In connection with the debut of this model the Ranger road race will be held. This will be a 3500-mile endurance test in the form of a tour of the southern states, starting and ending at Houston, with a big purse for a prize. Two Ranger cars will make the run, one going from Houston via San Antonio, Austin, Dallas, Oklahoma City, Little Rock, Memphis, Nashville, Chattanooga, Atlanta, Montgomery, Jackson, Baton Rouge and New Orleans, back to Houston, and the other car will cover the same route in a reverse direction.

The Southern Motors Co. has received approximately 1400 applications from southern drivers who wish to drive the cars on this tour.

On July 29 the Elgin Motor Car Corporation, Chicago, increased the price of Elgin Six models \$110, as follows: Touring, \$1175; scout, \$1895; sedan, \$2685.

### ECK VAPOR & PRIMER.

The accompanying illustration shows the automatic primer and vaporizer for cars, trucks and tractors which is being marketed by the "Eck" Vapor & Primer Co., 198 Oxford street, Rochester, N. Y., and is stated to be a wonderfully efficient device, easily installed and controlled from the instrument board, instantly convertible to a vaporizer or primer. It is claimed to economize fuel, reduce carbon and to insure starting at any temperature.

## Burdick Tire Co's New Factory Unit

The new factory unit of the Burdick Tire & Rubber Co., Noblesville, Ind., now nearing completion, is one story of brick, 75 by 120 feet, and will be used as a power house. The new factory building, which was completed about two months ago, is of solid reinforced concrete, 100 by 200 feet. It is three stories in height and contains over 75,000 square feet of floor space. By August the output is expected to reach 250 casings and 500 inner tubes a day, and by the end of the year 500 casings and 2500 tubes daily. With this as a basis the company will be turning out 2500 tires and 5000 inner tubes a day by the latter part of 1921, and to attain this production it will be necessary for them to employ over 1000 persons.

The officers of the company are as follows: President, H. G. Steinheimer; vice president and general manager, F. E. Teachout; secretary and treasurer, H. P. Steinheimer. The executive offices are at 10 South LaSalle street, Chicago, and the factory and general offices are at Noblesville, Ind.

### INCORPORATION OF VICTOR RITE-LITE CO.

The Victor Rite-Lite Co., Inc., 339-345 Bloomfield avenue, Montclair, N. J., has been incorporated with a capital of \$125,000, and having purchased the Standley Non-Skid Chain Co., it will automatically take over the national distribution of the Standley products, which will include the well known collapsible luggage carrier, non-skid chain, rim tool, etc.

The Victor Rite-Lite Co., will manufacture and feature an invention which can be readily attached to any car, and which will enable the lamps of the car to swing with the wheels, namely the Victor Rite-Lite, that is, when the car turns a corner the light is where it is wanted, on the road. This invention is very simple and will be a great benefit to the automobile world, in that it eliminates the danger of the curve and makes night riding safe.

Due to the fact that the company has already sold its entire output for six months in advance, it is now recapitalizing for \$3,000,000 in order to erect a foundry, enlarge the machine shop, drawing mill, warehouses, etc.

The concern is headed by Hector S. Hill, president, an eminent man in the automobile world.

### CLEVELAND DORT DISTRIBUTOR.

The Cleveland territory for the distribution of Dort cars has been assigned by the Dort Motor Car Co., Flint, Mich., to the Baker-Fisk-Hugill Co., 2106 Euclid avenue, Detroit, Mich., with J. J. Nelson as general manager. The State of Indiana has been taken over by the E. A. Bennett Motor Sales Co., 904 Meridian street, Indianapolis. Mr. Bennett has been the Overland distributor at South Bend, Ind., for the last six years.



# OVERHAULING THE AUTOMOBILE

(Concluded from June issue.)

**T**HE universal joints need attention in the overhaul and should be examined for wear and lubrication. Shake the joint with the hand and note the amount of play present. If any appreciable amount of wear is seen the joints should be taken apart and the worn parts replaced. Fill the joint with grease or steam cylinder oil and make sure that all nuts and bolts are tight and the bolt heads wired if necessary when reassembling.

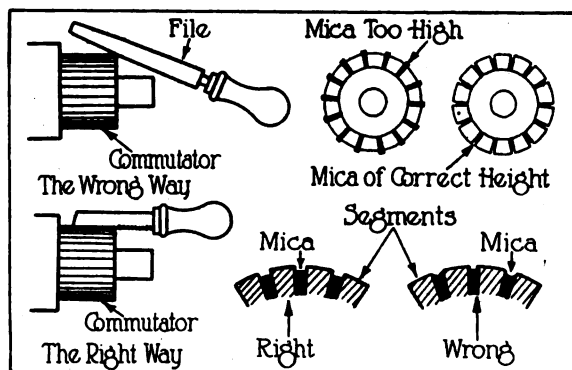
Make sure that the squared end of the propeller shaft has not worn out of square or that the socket into which it fits has not worn oval. Considerable wear takes place at this point during the life of a car and after a period of use extending over several years one will find considerable wear. This squared end is located at the upper end of the shaft, where it adjoins the gear-set universal joint.

## Rear Axle System.

The rear axle system and its components require considerable attention in the spring overhaul, for it is the axles and its parts that are called upon to withstand the shocks of the road and at the same time to drive the car. Many defects may develop in this unit which may not be apparent until the axle is disassembled.

Wear is probably the greatest source of trouble in the rear axle and lack of lubrication will cause many defects to develop. Attention in this respect will usually remedy most of the defects, while still others will require still more comprehensive treatment. In the modern automobile, using full floating type axles, the disassembling process is reduced to the minimum. Earlier models using the semi-floating or three-quarter type of axles require considerably more labor to remove the axles and their auxiliaries.

To remove axles of the semi-floating type it is necessary to raise the rear end of the chassis, taking the weight of the car from the wheels and springs and loosening the nuts and bolts holding the rear axle to the springs and the front end of the torsion rod or tube to the gearset, and also disconnecting the brake linkage from the brakes. With these removed it is possible to



Correct and Incorrect Methods of Undercutting Mica Insulation.

remove the axle system as a unit from beneath the car and place it on horses for disassembling. The wheels are removed, usually with a wheel puller, as they are fastened to the end of the axle shaft with a key and castellated nut, the nut being pinned with a cotter pin. Withdrawing the pin allows the nut to be loosened, then the wheel may be removed with the puller.

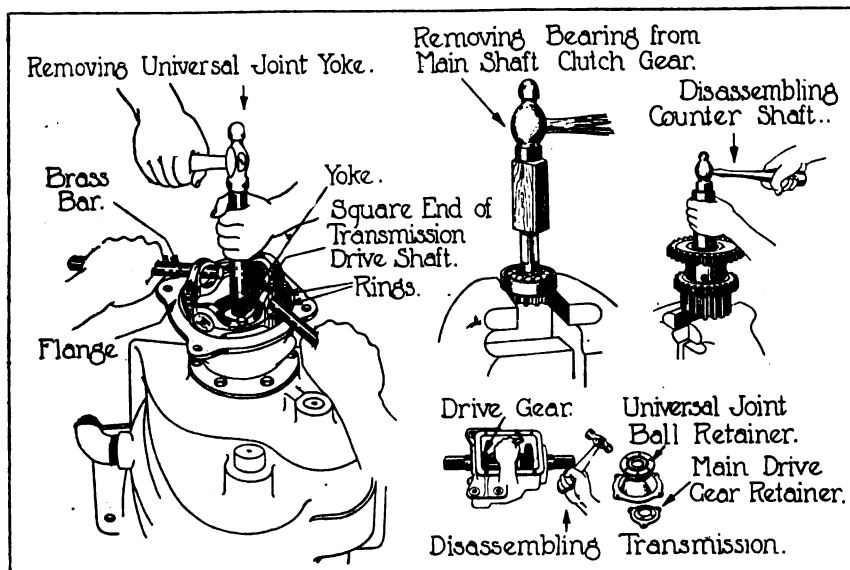
## Clean Differential Housing.

Take off the axle dust washer and cap around the axle and the roller bearing in back of it. Drain out the oil in differential housing and wash out with kerosene.

After the wheels and wheel bearings have been removed the nuts that fasten the differential housing at its center are loosened and taken out, also those that hold the drive shaft roller bearing housing to the differential housing. The radius rods are disconnected from the brake drums and the differential housing can be opened at the joint with a screw driver or other wedge-shaped tool. The left half of the axle housing is elipped from the shaft and the shaft withdrawn from the second half. Examine the axles carefully for wear at the point of contact with the bearings, also note whether the axle shafts are bent. This defect can be

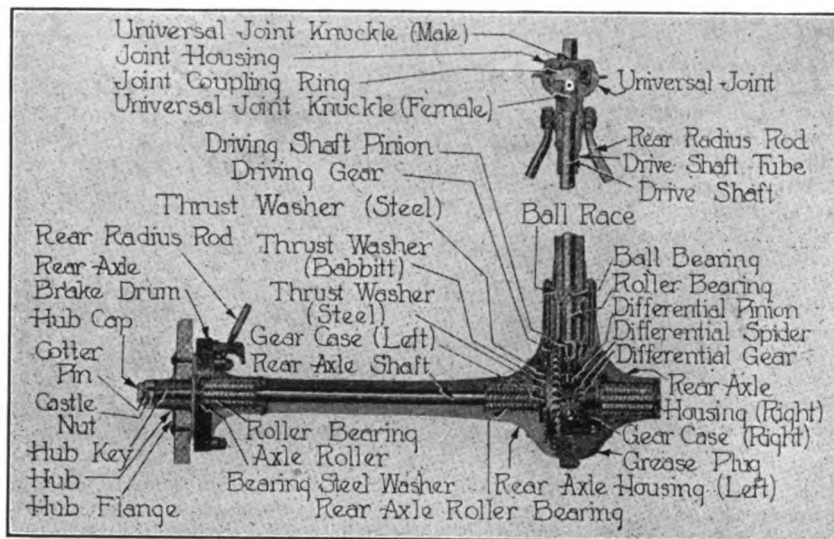
noted to better advantage by removing the shaft from the differential and testing on a clear spot on the bench, rolling the shaft lengthwise on the wooden top of the bench, or by placing in a lathe. Axles that are bent or worn excessively should be replaced, as they have a tendency to wear such other parts as the brakes, bearings, etc.

Bearings that are worn excessively or that cannot be adjusted should be replaced. To remove the axles from the differential case, place the shaft in a vise, fastening the vise to the shaft below the large bevel gear. Loosen and take off the nuts which fasten the differential case and separate the case. The small differential gears and the spider on which they are located can be removed, leaving the bevel gear attached to the half



Showing Method of Disassembling Universal Joint and Gearset of Chevrolet.

## REMOVAL AND EXAMINATION OF AXLES.



Ford Semi-Floating Rear Axle, Indicating Units of Axle System.

of the housing held in the vise. The axle is taken from the differential case by removing the axle from the vise and striking the smaller threaded end sharp blows upon the floor, forcing the large bevel gear and the half of the case down on the shaft. The end of the axle is exposed, also the small bevel gear attached to the end by a split ring fitting in a groove in the shaft. Remove the ring and drive the gear off the shaft by placing the shaft in the vise and forcing the shaft through the hub of the gear and the half of the differential case by driving with a wooden block or other soft material till the axle comes off.

The gear on the second or right hand axle is removed in a similar manner. The replacing of new axles is the reverse of the disassembling process and requires quite a little time to do in a proper manner. Tools can be purchased that will make the work of separating the gears from the shaft considerably easier. Such tools are not costly and where much work of the semi-floating type is handled the repairer should equip his shop with these tools.

The removal of the three-quarter axle is effected in a manner similar to the semi-floating type, the main difference being that the weight of the car, instead of being carried on a roller bearing located in the end of the axle housing and fitting the axle shaft, is borne by a bearing located on the outer end of the housing on top and fitted directly to the hub of the wheel. Thus the axle shaft is relieved from the weight of the car. The axle is fastened to the wheel hub in the same manner as in the semi-floating type with a key, nut and cotter pin.

The full-floating type differs from either the semi-floating or the three-quarter floating axle in that the axles can be removed from the car without disturbing the differential. The axle is fastened to the hub by means of a claw or dog fitted at the end of the wheel hub. Other manufacturers have the axle welded to the hub and provided with a

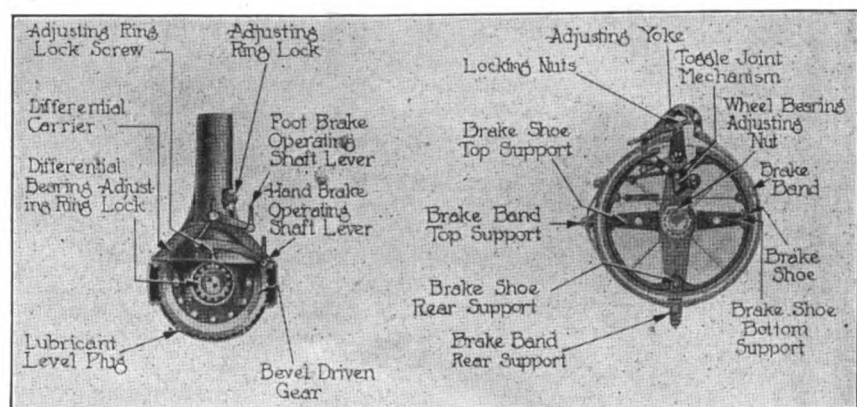
flange which is bolted to the hub flange of the wheel. The axle end fitting the differential is splined so that insertion of a new axle or the removal of a broken axle is easily accomplished. The full-floating axle, unlike the semi or three-quarter floating, does not allow the wheel to come off the axle housing in case the axle is broken, as the wheel is fastened to the axle housing by a washer and hexagonal nut, one edge of the washer being bent in the shape of a lip to prevent the nut from turning loose. The axle is removed by loosening the nuts around the flange and pulling out the flange and axle from the axle housing. A new axle is installed in the reverse manner, the wheel is not removed and takes the weight of the car.

The large bevel ring gear is adjusted by means of collars or rings located at each side of the differential. These rings are locked with a form of locking pin, the device varying in different cars.

The Timken roller bearing axle, as used in Reo passenger car, is equipped with two adjusting collars, one at either side of the large bevel ring gear, and a very close adjustment of the large bevel gear and the small bevel pinion can be obtained.

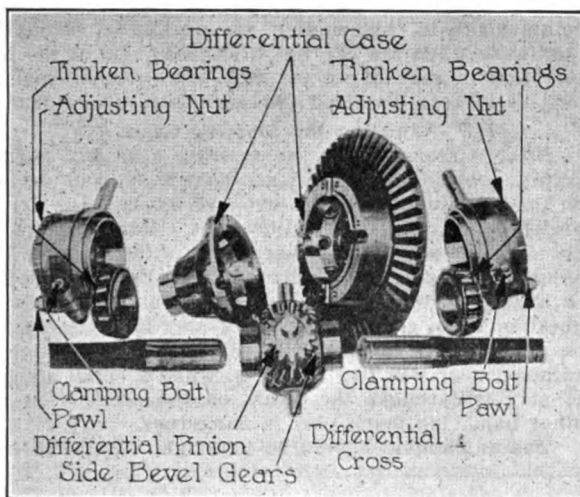
Axles equipped with ball bearings at the differential are fitted usually with one adjustment collar, and with this the gears can be forced either closer into mesh or further apart, as required. Grinding or humming noises at times occur in the differential and these may usually be traced to gears that have been too closely meshed. When new gears are installed the repairer sometimes is unable to get the correct adjustment and noises of this nature will occur. The best procedure then is to have an experienced repairer make the adjustment.

The gears should be examined for broken teeth. Pieces of broken metal found between the teeth should be removed, the gear taken from the differential housing flange and the teeth still more closely examined. If broken teeth are found, fit a new gear, if the edges of the teeth are chipped, but not broken, the corners can be dressed off on the emery wheel to a bevel and the gear will continue to give good service.



Left, Typical Floating Axle, Showing Location of Ring Gear Adjustment and Units; Right, Internal and External Brake Adjustments, Units Indicated.

## ADJUSTMENT OF BRAKES.



Differential Units, Disassembled, as Used in the Modern Automobile.

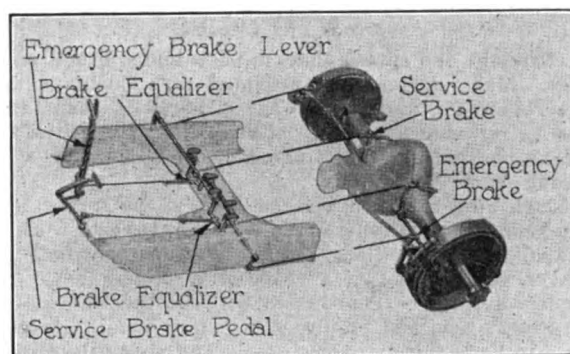
When assembling the semi-floating or the three-quarter axle, follow the reverse order from that of disassembling, tightening all bolts and nuts securely, placing cotter pins where required, supplying lubricant to the bearings as they are fitted and adjusting the bearings carefully. In fitting the outer sleeve bearing fill the rolls with grease when the bearing is inserted in the bearing sleeve, fit the felt dust washer tightly, jamming it into the housing. Fit the metal dust cap over the felt washer and attach the wheel, forcing it into place over the key. Screw on the nut as tightly as it can be drawn up and fit the cotter pin in the castellated nut and the opening through the axle, bending over the cotter pin so that it cannot work out. Fill the differential housing with steam cylinder oil to the height of the filling plug opening and replace the filling plug. Connect the radius rods to the brake and pinion shaft bearing housings to the differential housing, tightening all bolts and nuts securely as fitted. Slip the assembled axle housing and drive shaft under the car, placing the squared end of the propeller shaft in the squared socket of the universal joint, connecting the springs to the spring perches and the brakes to the brake linkage.

Fill all the grease cups of the rear axle system, after the axle is assembled to the car chassis, and turn them down till it is certain that grease is entering the bearings. If more than one cupful is required, fill a second time and turn down.

Brakes will probably be found to need adjustment regardless of the mileage that the car has been driven, unless this was attended to just before laying the car up for the winter. In case the brake lining is badly worn it should be removed from the brake band and replaced with new. Purchase the best grade obtainable and reline the brakes according to instructions. To properly set the brakes two men are necessary, one to try

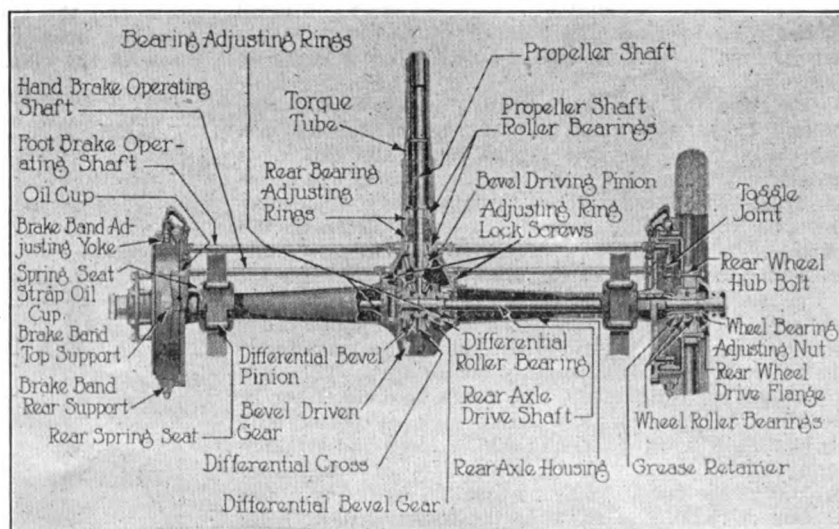
the setting with the pedal or lever from the seat and the second to make adjustments at the brakes. Jack up both rear wheels, first blocking the front wheels so that the car cannot work ahead off the jacks. Loosen the brake linkage on the service brake first. This linkage is connected to the foot pedal and to the outer brake shoe on the rear wheel brake drum in most instances, although in many cases it is located in the rear of the transmission on the propeller shaft, operating on a special brake drum attached to the shaft with a key.

When located on the wheel drum, make the adjustment one side at a time, testing the adjustment with the foot pedal and trying to turn the wheel against the brake. Set the brake on the opposite wheel in the same manner and continue to make adjustments till both wheels lock evenly and neither wheel will turn when the brake is applied. With the brake released note whether the wheel turns freely without binding between the brake lining and drum. If too tight loosen the adjustment slightly till a point is reached where the wheels lock evenly and the wheel turns freely with



Braking System as Employed in Modern Passenger Car.

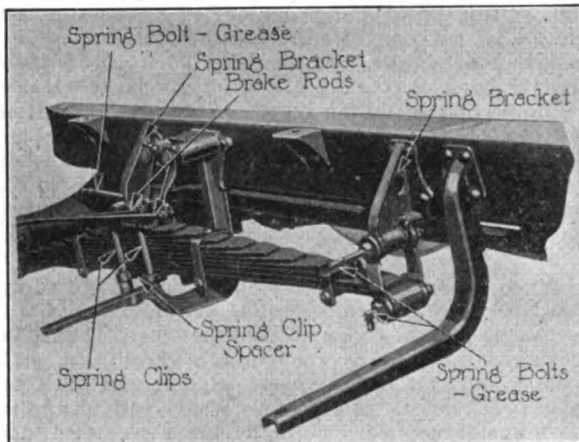
the brake released. Adjust the emergency brake in the same manner using the emergency brake lever or pedal to test the final adjustment. Lubricate the brake linkage at all joints and all bearings of the cross shafts of the linkage so that it works freely. Keep in this condi-



Three-Quarter Floating Axle as Seen in the Dodge Car.



## SPRINGS AND CHASSIS AND STEERING GEAR.



Cantilever Rear Spring Found on Many 1919 and 1920 Passenger Cars.

tion and you will always have a set of brakes that will work satisfactorily.

### Springs and Chassis.

Examine the spring shackle bolts and the bolt openings. Many springs are provided with bushings that are renewable, and when wear is found in them, they can be replaced at a small cost, making the use of the spring continuous, unless damaged by broken leaves or spring clips.

Jack up a corner of the car body of the spring, if of the semi-elliptical type, opening the leaves and working graphite mixed with oil into the space between the leaves with an old case knife or a broken hack saw blade. Springs become rusted between the leaves after a season's use, and require lubrication once or twice a year to keep them working freely and smoothly. Graphite and oil is used almost exclusively for this purpose and does the work satisfactorily.

Broken leaves should be removed and replaced with new. Spring clips that are loose on the spring should be tightened, as they allow the leaves to shift sideways, spoiling the action of the spring and possibly allowing it to become damaged. Tighten the spring to the axle by drawing down on the spring clip nuts under the axle as looseness at this point will cause the spring to move endways on its plate and possibly cause the spring to break when passing through a hole or over a bump on the road.

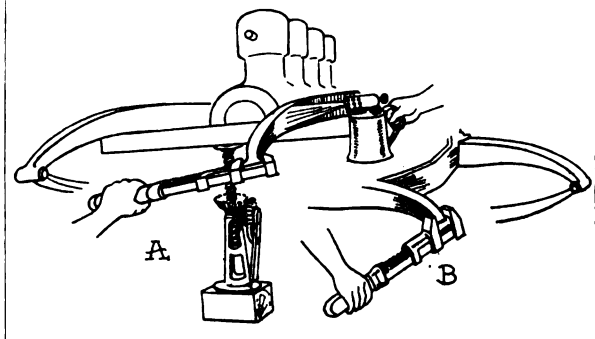
Examine the chassis carefully for loose nuts and bolts. These will work loose during a season's use, especially where the traveling is rough and the roads in poor condition. Loose bolts in the chassis will cause the frame and parts attached to it to weave when passing over rough going, throwing a heavy strain on the parts. Tighten all nuts securely and fit new bolts wherever excessive wear is shown. Examine the car frame and note whether it is bent at any point. The car may have been in an accident that did not cause serious trouble at the time, but the frame may nevertheless have been bent slightly out of true. This is a good time to straighten it, and it can be done either by bending the metal with a lifting jack, or better still, by heating the bent part with a blow torch and straightening with hammer blows while hot. If cracked or broken at the bend, it may be repaired by fitting a new section of channel steel inside the frame, drilling holes through the frame and the patch and hot riveting, afterwards brazing with a brazing torch and brazing spelter.

Joints made in this manner are usually as strong as they were when the car was first assembled at the factory and in case of an old car, will probably last as long as the car, provided the work is carefully done.

### Adjusting the Steering Gear.

After a season's use the steering gear will need a certain amount of adjustment; how much will depend on the amount of play present and whether the driver prefers a tight or loose adjustment. Many drivers do not care for play in the wheel, preferring to have the adjustment tight, while others believe that it is better to have a certain amount of movement. There is no question but a certain amount of play is advisable, for on a long drive the motorist will notice that a tightly adjusted gear will tire his arms, while a small amount of play will relieve the strain on the arms. On the other hand, too much play is dangerous.

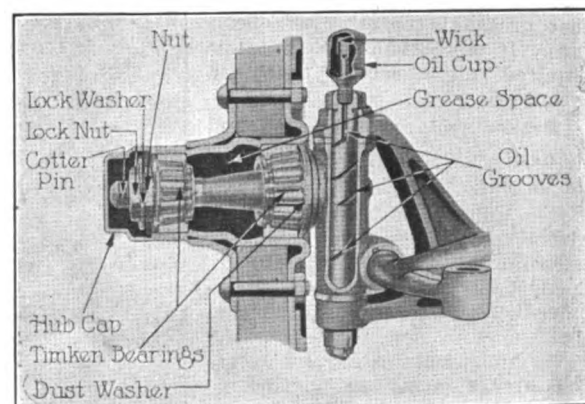
The adjustment should be just tight enough so that



Straightening Front Member of Frame, Using Blow Torch and Wrench.

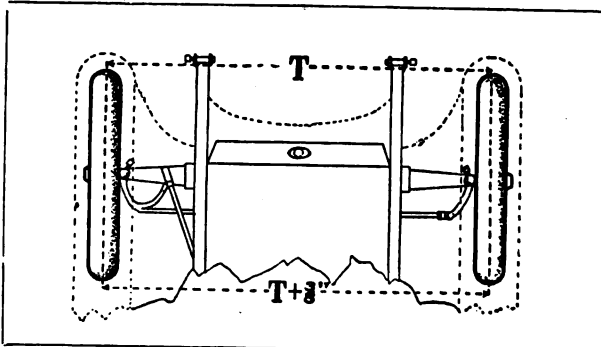
the operator has instant control over his machine and still the steering of the car does not tire him. Adjustment is easily made at one or two points on the steering gear; one is located on the steering post and consists of a large hexagonal nut or bushing fitting around the shaft tube and tightened with a set screw and clamp, preventing it from working loose. Loosen the clamp set screw and turn the large hexagonal nut to the right or clockwise to take up play between the worm and the sliding blocks of the gear. When the play has been taken up sufficiently, tighten the set screw in the clamp.

End play in the steering sector shaft is removed, in



Front Axle Assembly, Timken Roller Bearing Type.

## FRONT WHEEL WEAR AND ADJUSTMENT.



Proper Method of Aligning Front Wheels.

some cars, by an adjustment on the inner end of the shaft adjoining the gear case, an eccentric bushing being located at this point, which adjusts the gear in the gear case and forces the shaft either in or out as desired. Play in the steering arm on the outer end of the shaft is sometimes eliminated by turning the shaft over for half a turn, presenting a new surface on which the arm is clamped. Play in the steering reach rod between the arm and the wheel spindle arm is cared for by spring adjusters and ball joints. A steel block is fitted at one side of the ball and a coil spring is placed in the rear, while an adjustable threaded nut fits the tube at the end of the rod and is held in place by a long cotter pin passing through the sides of the tube and the head of the nut. Tightening the nut against the spring will force the block more firmly against the ball end of the arm and takes out lost motion. Play in the tie rod between the wheels is best eliminated by fitting new bushings in the tie rod ends and the wheel spindle arms, although many times this can be eliminated by simply tightening the bolts. Good judgment on the part of the repairer can determine what is required.

## Front Wheel Wear and Adjustment

Considerable wear will take place at the front wheels if the car has been driven a considerable number of miles, since last being overhauled. It is a good plan to remove the wheels from the axles and examine them. Bearings that are worn excessively, or that are broken, should be replaced. Bearings that are loose on the axle should be adjusted to a point where the wheel will turn freely and not bind. Cones and cups that are chipped or badly worn should be replaced, as they cannot deliver satisfactory service in their worn condition. After replacing the bearings and making the adjustments, refill the hub cap with grease and screw the cap on to the hub. The grease will be forced through the bearings and will show on the inner side of the hub when sufficient has entered. Test the alignment of the

wheels and if found out of line adjust properly by means of the tie rod adjustment.

## Examine the Condition of the Tires.

Examine the tire and tube equipment and note their condition. If the tires are badly worn on the tread a few additional miles can be had from them by placing them on the front wheels and placing the tires that are in the best condition on the rear wheels. In this way the tires that are in the best condition will take the driving strains, while those that are weakened are on the front wheels, where they do not receive driving strains. Many miles can be gained in this manner.

Punctured tubes should be sent to a tire repairer and vulcanized. Home patching of tires or tubes is all right in case of an emergency, but for permanent work, vulcanizing is by far the best. The cost is somewhat greater, but the service gained with vulcanized tubes is much greater than when patched.

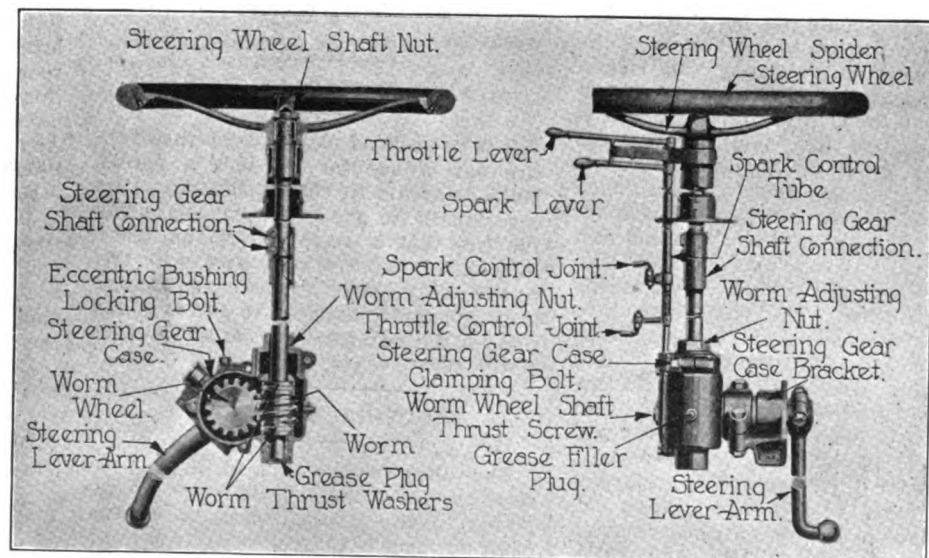
Sand blisters in the tread of a tire can be filled with a purchased preparation that is claimed to prevent tire fabric from rotting, due to the action of water, and dust getting into the cut, provided that the repair is made in time. The better way is to vulcanize a patch into the cut and thus prevent absolutely the entrance of water or dust.

## Repainting Car and Dressing Top and Upholstery.

Quite naturally the motorist who has overhauled his car himself also intends to give it a coat of paint and varnish. Dressing of the top and upholstery should also receive attention. As this subject has been covered recently in other articles it will not be discussed here. Suffice it to say that this should not be overlooked in overhauling the car.

(This is the concluding installment of the article on Overhauling the Motor Car, which was started in the April issue. Taken in sequence they form a complete overhaul review.)

When starting motor for any reason lacks power to turn over the crankshaft it may be strengthened by coupling on another storage battery, connecting it in multiple so as not to increase the voltage. If the conducting wires are of sufficient size from the battery to the motor there will be a considerable gain in power output.



Steering Gear of the Modern Automobile, with Parts Indicated.

## How to Enamel the Car Body

THE first essential to a good job of enameling is the proper preparation of the surface. This must be made perfectly smooth by cleaning off with a paint remover, rubbing down with pumice, filling and sand papering, being careful not to miss the corners, depressions of the molding, etc., as the glossy finish will show the slightest defect.

After cleaning thoroughly apply a coat of paint to the work prior to filling up, as any roughness is then much more easily detected and rectified. A hard drying paint is best to use for this work, as it is much easier to sand paper smooth. A pale Japan gold size or varnish is good in conjunction with pure turpentine.

In applying the paint it should always be remembered that it should be put on thinly and evenly, even if this necessitates an extra coat. If put on too thick the time lost in sand papering will more than overbalance that gained by using a thicker paint, and, in addition, it will not dry so hard. It is also difficult to keep brush marks from showing in this paint.

Let the first coat of paint stand for two hours or more until thoroughly hardened, and then fill up. For this a filler can be bought ready mixed, but if preferred it can be made by mixing one part good Japan gold size and two parts turpentine with dry white lead and adding a little old white lead to prevent it setting too quickly.

### To Apply Filler.

To apply the filler requires some skill and experience; generally it is best put on with a broad knife, using a brush only for the moldings and places that cannot be reached with a knife. In spreading the filler hold the knife rather flat and close to the work and turn it almost to right angles to scrape off the superfluous material. In doing which care should be taken that the knife does not become clogged. It should be done with one stroke from the top to the bottom of the piece of work to prevent making ridges. The composition used on the curved portions should be a little thinner so that it can be applied like paint. After the whole has dried thoroughly go over it and fill any cracks, dents, etc., with thick filling. If it is not then perfectly smooth it should all be gone over again and still again, until it is satisfactory. This done and the work well rubbed down, recommence painting. The paint should be similar to the former and it should continue to be used until the coat preceding the enamel. This latter coat should consist of two parts varnish or Japan gold size to one of turpentine mixed with lead or some of the finishing enamel should be thinned a little with turpentine and used as paint. By this last mentioned method the enamel not only covers much better, but retains its luster and whiteness longer.

A novel trunk holder contains springs to prevent the contents of a trunk being shaken about.

## PROTECTING THE OPEN CAR FROM RAIN.

Many motorists prefer to keep their car tops down in summer. This is the season of sudden rain storms and an open car is often seen parked beside the curb while the owner is in office or store, the seats so deluged by the down-pour as to make it impossible to use it without the occupants getting clothing wet.

Here and there will be noted a man who has solved the problem in a simple way. A blanket is made of top material—either pyroxylin coated or rubberized. It need not be as heavy as the top. The making of it is a simple matter, consisting merely of cutting the goods to the desired size and hemming the edges. It can be folded and tucked out of sight when not in use. Materials are obtainable from top makers, trimmers and at some department stores.

The motorist spreads the blanket over his car, while leaving it to enter a building, if there appears to be danger of rain. This saves the time and bother of putting up the top. Drivers who have these blankets claim that they are a great convenience.

## MAKING USE OF OLD ENGINE OIL.

Springs are designed to have a certain amount of what the engineer terms "inter-leaf friction." If the leaves become rusty, in the majority of cases the friction between the leaves is too great. The proper method of preventing hard riding from the above cause is to spread the leaves, clean them and replace the heavy graphite lubricant. If time does not permit, however, it will be of considerable advantage to wipe the sides and bottom of the spring free from all foreign matter and paint these surfaces with used engine oil. After a short ride, considerable of this oil will work in between the leaves and suffice for a time to prevent undue friction. The excess oil should be wiped off after the car is washed.

## USE THE SPARE TIRE.

It is not a good plan to keep the spare tire out of use for too long a period. Make it a rule to change the spare tire occasionally to one of the wheels, using the tire that is removed for the spare. It will be found that a tire will last considerably longer when in use than if it is constantly exposed to the sun and rain on the running board or at the rear of the car.

## WINDSHIELD SOLUTION.

The disagreeable part of driving in sleet or rain is largely eliminated by applying to the windshield, with cheese cloth or gauze, the following solution: One ounce of water, two ounces of glycerine,  $\frac{1}{2}$  ounce of salt. This after being applied to the glass will prevent the rain or sleet from staying on and interfering with the driver's vision.

## The Proper Use of Tire Chains

MUCH might be written about tire chains and every word be of value to the automobile owner. There is a right way and a wrong way to apply chains, as well as a right and a wrong way to use them. They may be so adjusted as to ruin the tire or to permit their use with the minimum of harm. The proper application of chains should be thoroughly familiar to the motorist, for they are an all-the-year-round necessity, although used less frequently in summer. Heavy rains soon make roads just as dangerous as in icy weather so that chains should always be carried in the car. One for each wheel should always be carried by the tourist. He should use as many as the occasion seems to demand, but the rear wheels should be equipped first. If only one is used it should be put on the left rear wheel so as to avoid damage when stopping or starting at the curb, and if two are carried both should be installed on the rear wheels.

If the chains are not new before being used they should be inspected carefully to see if any of the cross links need replacing. Careful drivers replace the parts that are almost worn through. Others wait until the links break and carry extra lengths and install them on the road. This is poor practise, as when one link breaks a space is left on which the tire can slip, causing a greater strain on the next link.

It is necessary to jack up the wheel or lay the chain out on the ground when putting it on the tire. Turn the points of the cross links out so that they will not dig into the tire, then drape the chain over the wheel with the clamps toward the rear, hanging down so that they just touch the ground. Straighten out all that portion of the chain that lies on the ground in front of the wheel outside of the wheel and towards the rear. Run the car forward just far enough to bring the balance of the chain out at the rear. Having the clamps at the back they are drawn around with a whipping motion that tends to keep them closed. Applied in a reverse direction they are liable to open.

Never use a tool to tighten a chain, as it is liable to cut into the tread of the tire. If a chain cannot creep it will wear continually in one place. As soon as the roads are dry remove the chain, as continuous driving on dry roads will wear the steel of the cross links needlessly.

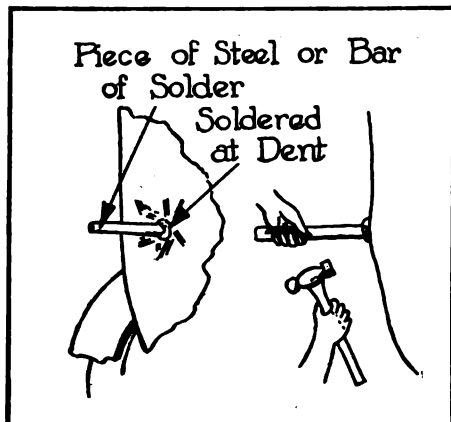
Broken links may be removed on the road by the use of a repair tool, which should always be carried, together with a supply of extra links. The chain itself need not be removed from the wheel. A little practise with the tool will soon make one proficient. When chains are not in use they should be hung up and smeared with a mixture of equal portions of cylinder oil and kerosene to prevent rusting. A good set of chains should last several years with the occasional replacement of cross links.



## Mechanical Hints for the Motor Car Driver

### REMOVING DENTS IN BODY PANELS AND TANKS.

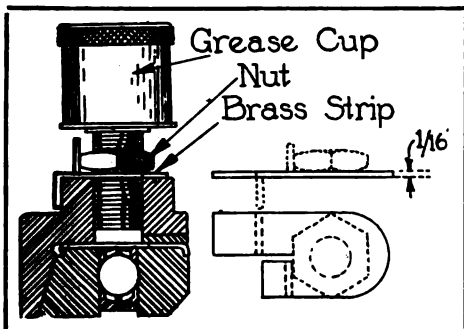
Automobile bodies often become dented through accident and the motorist is



at a loss how to remove them without going to considerable expense. A practical method for removing them consists of soldering a bar of steel or solder to the center of the dent, as indicated in the illustration. The dented area is tapped lightly with a hammer and a strong pull is exerted at the same time with the rod. Unless the metal is unusually thick the dent can be removed with very little difficulty.

### HOLDING GREASE CUP ON CLUTCH HUB.

Often the cup which supplies grease to the hub of the clutch spider will work



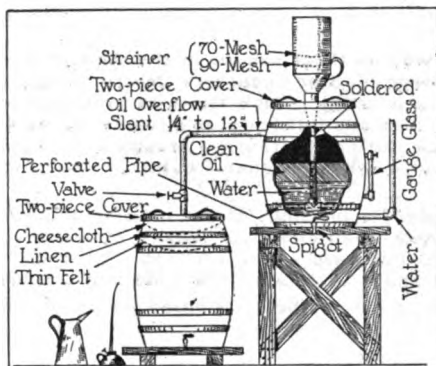
loose and as it is in a position where it is difficult to enter, recourse may be had to the following method which, it is claimed, will keep it tight:

A strip of 1/16 inch sheet brass is inserted beneath the lock nut, one end being bent up against the nut and the other against the edge of the clutch housing. The strip of brass serves as a positive lock for the cup.

### HOME-MADE OIL FILTER.

A home-made oil filter will save its cost many times over during the course of a year by filtering oil taken from machines during overhauling, allowing the filtered oil to be used for other purposes, such as oiling machine shop tools, etc.

The filter is made by using two casks or barrels, one of about 30 gallons ca-



capacity and the second about 15. The larger cask should be set on a platform raised about four or five feet from the floor, while the smaller cask is elevated only about three or four inches.

Remove the end of the larger cask and replace it by two separate covers and a center section solid with the cask. Through this center section fit a vertical two-inch pipe, terminating at the bottom in a T and to the T fit two horizontal pipes of the same diameter, having two rows of 1/8 inch holes drilled in them, and fit caps to the ends. At the side of the cask fit a glass gauge to show the height of water in cask. Fit a 1/4 inch water connection to allow water from the pressure system of the shop to enter at the bottom. About one foot down from the top fit a 1/4 inch pipe and slant it to an elbow above the 15-gallon tank and lead the pipe down into the second cask.

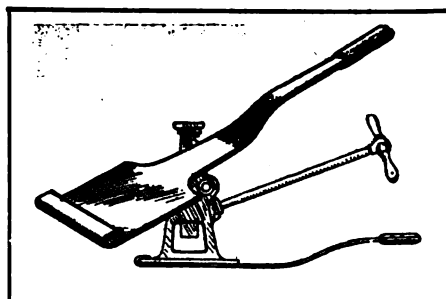
The two-inch pipe in the upper cask is fitted at the top with a tunnel having two wire screens, one of 70 mesh and the second of 90 mesh, through which the oil is strained.

The lower cask is equipped with a strainer to remove any foreign matter that may have come from the washed oil as it passes from the upper to the lower cask, made of three thicknesses of cheese cloth, linen and thin felt.

The filtering material should be removed and washed with kerosene whenever sediment is apparent. The oil is forced over into the filtering cask by admitting water to the lower cask, bringing the washed oil higher in the upper cask till it overflows into the filtering cask.

### PLACING JACK UNDER AXLE.

Many times a puncture will occur in a tire on a rainy day when the car is being driven on the road. To get the jack out of the tool box and place it under the axle is a job that usually gets the oper-



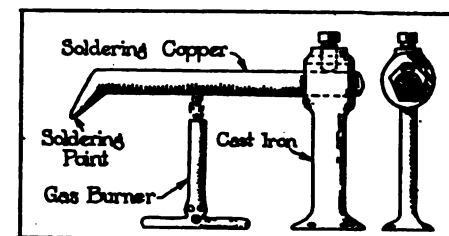
ator covered with dirt and mud, ruffling his temper and ruining his clothes.

To facilitate the insertion of the jack and prevent the operator's clothes from getting soiled, the device shown in the illustration was developed.

It consists of a flat section of sheet iron shaped as shown, provided with a lip which fits over the front end of the jack base, and is provided with a wooden handle by which the operator, after placing the jack on the pan of the device, pushes it under the axle.

### A SOLDERING IRON FOR FAST WORK.

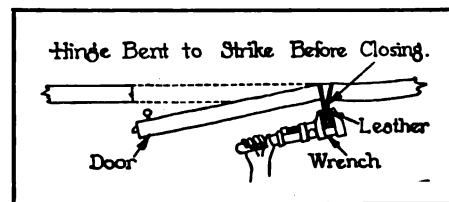
A soldering iron that will enable the service station repairer to more than



double the amount of work that he can turn off in a given length of time is shown in the illustration. The post consists of an old casting that is screwed to the work bench, which should be about six inches high to the opening into which the iron is fastened. It is held tight by a set screw passing through the top. The iron consists of a flat bar of copper, 10 or 12 inches long, three inches deep and 1/4-inch wide, having the end pointed as shown in the illustration. The gas flame is placed midway between the stand and the tip of the copper, heating the point sufficiently to keep it at the right temperature for quick soldering.

### BENDING HINGES OVERCOMES RATTLING OF DOORS.

In light cars especially, the doors, after a few months will often start to rattle,



causing considerable annoyance. Different methods have been devised to overcome this, but a simple and easy way is shown in the illustration.

Take a good sized monkey wrench and place a piece of leather at each side of the spring to prevent the paint from being marred, fitting the blocks between the jaws of the wrench. Place the wrench as shown, with the handle toward the front end of the door, and bend the hinges backward slightly. This will cause the straight side of the hinge to strike the bent portion before the door entirely closes, putting a tension on the hinge and removing the rattle.

# ACCESSORIES FOR THE TOURIST

**T**HE following line of accessories, as well as those shown in the Annual Touring number of the Automobile Journal, if featured a little by the garage man or accessory dealer, should prove a source of profit in addition to the all-the-year-round goods carried in stock. Such items as camp equipment of all kinds, including tents, portable stoves and other cooking apparatus, dish and luncheon sets, cameras, field glasses and other optical goods, etc., could easily be added to the regular stock during the touring season and, if properly displayed and advertised, many dollars worth could be disposed of without much additional trouble on the part of the dealer, and a tidy sum added to the net profits for the season.

A motorist, when laying in a supply, for his tour, of the articles and equipment usually to be found in the accessory store, would doubtless be attracted by an effective display of these so-called side lines, and would be reminded of things he perhaps intended to purchase elsewhere and, if the goods are up to standard and the prices right, would oftentimes buy on the spot and save himself the time and trouble of looking elsewhere.

This is a matter worthy of consideration by the far-sighted accessory dealer who is ambitious to increase his business in all possible ways.

## CAMP FIRE TRIPOD AND GRATE.

The Umbrella Camp Stove Co., Mount Vernon, Wash., makes the Umbrella camp stove, which is shown in operation in the illustration. This device is a patented ar-

is fastened the wire grate, which may be placed directly over the fire and is of sufficient size to accommodate several kettles and pans. The Umbrella camp stove is constructed in such a manner that it may be easily folded when not in use and oc-

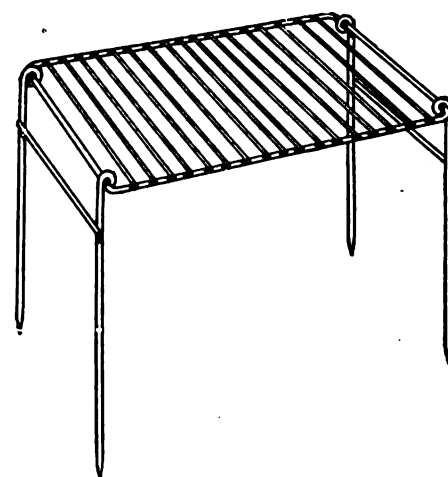
## CAMP FIRE GRATE.

The Union Steel Products Co., Albion, Mich., manufactures a grate for the camp fire which folds flat for carrying and proves a very handy device for the motorist when camping. It is a frame made



ticle which, according to the manufacturer, may be set up in any convenient place, either on the level or a grade, where it is possible to build a fire. A center leg is added to the tripod, to which

cuples but little space on the car. A carrying case is also provided into which the parts of the stove are packed. The device is made of metal throughout and is claimed to last almost indefinitely.



of steel wires to which the steel cross wires are fastened. The folding legs are sharpened at the ends so that they may be easily pushed into the ground. The top surface is of sufficient length to accommodate kettles and pans of various sizes.

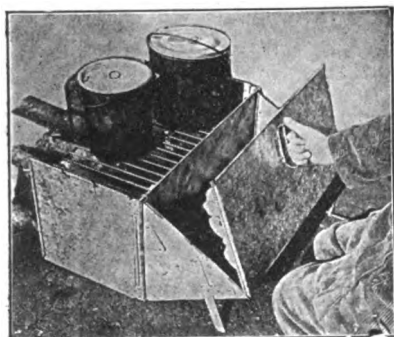
## FOLDING CAMP FIRE STOVE.

The Read-E Co., 20 East Broad street, Columbus, O., manufactures the Read-E camp fire stove, which offers many points to be desired by motor campers. It is designed to be placed on the ground over a

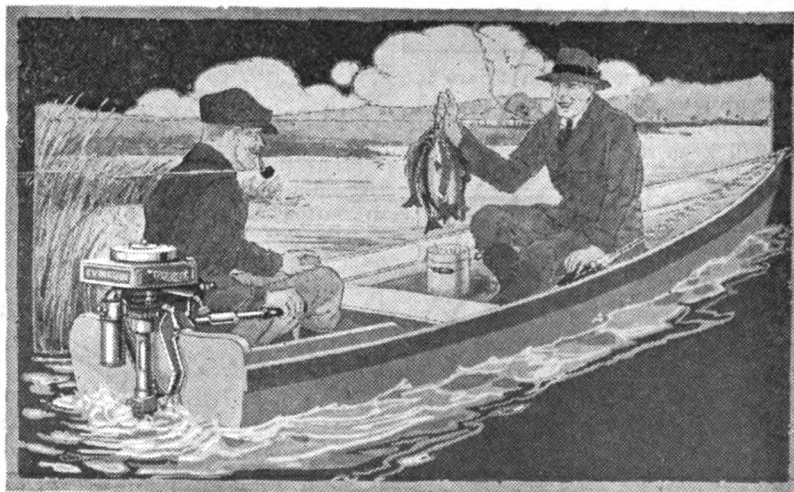
## EVINRUDE ENGINE FOR THE ROW-BOAT.

The Evinrude Motor Co., Milwaukee,

in weight and are easily transported from place to place, either in the car or by rail. The Evinrude engine is easily attached to the canoe or boat in a few min-



small fire and is enclosed on three sides. A grate is provided across the top on which the camper may place such articles as kettles and pans, while on one side an oven is attached which can be used for roasting, baking, etc. The device is light in weight, made of metal throughout and when not in use, folds into small space.



Wis., manufactures a complete line of outboard and inboard engines for the row boat and canoe. These engines are light

utes time as no cutting or fitting is required, and once in place it is stated that it will supply plenty of power.

**ANGLE LAMPS FOR CAMP.**

The Angle Manufacturing Co., 110 West 40 street, New York city, manufactures the Angle Lamp, which is especially suited for campers in that kerosene is used for fuel, and is said to give an unusually bright light for reading or other purposes. Angle lamps are constructed of brass throughout, use but little oil and give an intense white light, without shadows be-



low the flame. It is claimed that these lights are easy to care for, burn without noise and can be lighted similar to the ordinary kerosene lamp.

**UNION FOLDING CAMP GRATES.**

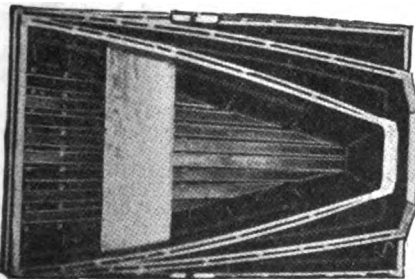
The Union Steel Products Co., Ltd., Albion, Mich., manufactures a line of camp fire grates that are stated to be a neces-



sity, summer or winter, for the motorist who spends much of his time out of doors. The grate shown is known as Style M and is made of steel wires, folds into a small package when not in use and occupies but little space in the car.

**SECTIONAL STEEL BOAT.**

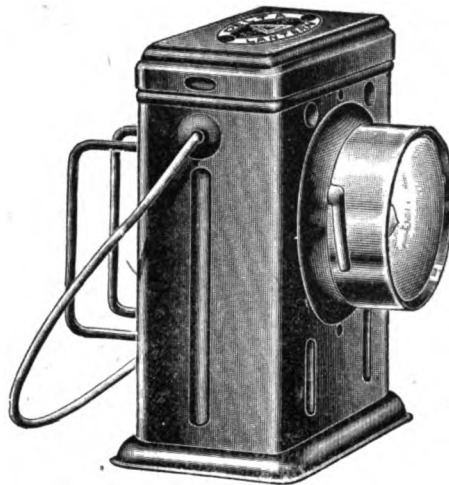
The F. H. Darrow Steel Boat Co., Albion, Mich., manufactures a steel boat that appeals to tourists from the fact that it can be taken apart in sections and trans-



ported on the side of the car to whatever location the motorist chooses to camp. The boat is made throughout of steel and can be equipped with a small gasoline motor which converts it into a small power launch at small expense.

**DELTA ELECTRIC LANTERNS.**

The Delta Electric Co., Marion, Ind., shows a unique electric lantern for the camper, hunter, etc., that meets every re-



quirement. The lantern is designed for hand use and is provided with a bale handle for carrying. The source of current supply consists of two dry cells, connected to the bulb in front, which is capable of throwing a beam of white light over 100 feet. A flanged base prevents the light from tipping over when placed on the ground or other flat surface.

**TAYLOR COMPASS.**

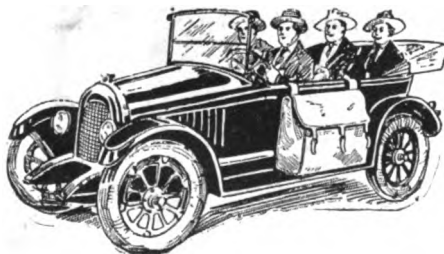
The Taylor Instrument Companies, Rochester, N. Y., manufactures a compass for motorists and others who lead an outdoor life that is especially adapted for the



work. The instrument is stated to be very accurate, is of a size suitable to be carried in the vest pocket, and is graduated in degrees plainly marked in such a manner that they are easily read.

**THE AUTOPACK.**

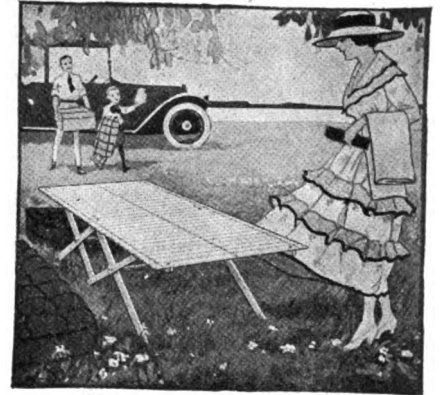
A. J. Peterson, 15 Phoenix building, Duluth, Minn., manufactures the Autopack for tourists, which, it is stated, fills a long



felt want. There are many small articles which the motorist wishes to include in the outfit for which there is usually little or no room. The Autopack fastens to the side of the car body, the bottom resting on the running board, and is of sufficient size to carry much of the luggage usually carried in suit cases. It is made of heavy water proof auto top cloth and in two styles, one for the Ford or cars of similar size, and the other for cars of larger size.

**OUTING LUNCH TABLE.**

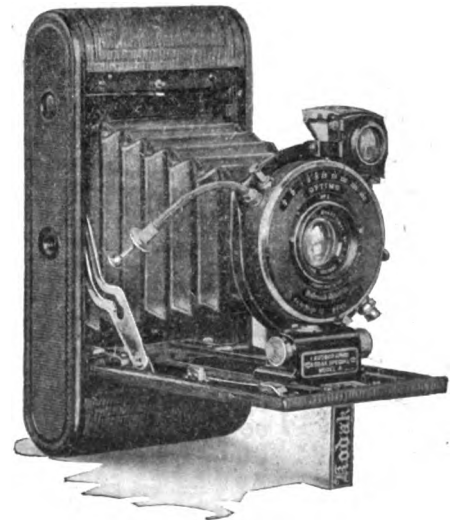
The Puffer Hubbard Manufacturing Co., Minneapolis, Minn., manufactures a table



for the motorist that is used to advantage when camping or on outing trips. The device is light in weight, occupies but little space on the automobile when folded, is built strongly and will last for many years.

**EASTMAN KODAK NO. 1-A.**

The Eastman Kodak Co., Rochester, N. Y., manufacturer of the famous Eastman Kodaks, is showing the No. 1-A Autographic Special Kodak which is recommended to motorists for taking pictures while touring. The 1-A is equipped with



the Kodak range finder, anastigmat lens f.6.3 and Optimo shutter or, for an additional price one may have a Bausch & Lomb No. 2 Kodak anastigmat f.6.3 lens, with a 5½-inch focus. For high speed, or accurate work, it is stated that this outfit is unexcelled.

**UMBRELLA CAMP STOVE.**

The Umbrella Camp Stove Co., Mount Vernon, Wash., manufactures a unique device for the camper which is well named the "Umbrella Camp Stove." This device is constructed in the form of a four-legged standard, three at the side and one in the center, hinged at the top.



## TENTS FOR THE MOTORIST.

The F. J. Burch Manufacturing Co., Pueblo, Col., is showing a very complete line of tents for the automobilist in a new catalogue which is just issued. Tents for motorists are shown in several popular designs, as well as the necessary fittings



that may be included if the purchaser desires. These fittings include auto beds, mattresses, chairs, hammocks, canvas grips, water bags, etc., and give the motorist a good idea of what would be required to equip his car for a camping tour. All of the goods manufactured by this company are stated to be of a high quality, while the prices for the various articles are not excessive.

## HAND ELECTRIC LIGHTS FOR THE AUTOIST.

A very handy electric light for the autoist is marketed by the American Ever Ready Works, Long Island City, N. Y., which is of a size convenient to be car-



ried on the car seat. A light of this size and type should prove very handy to the autoist traveling after dark, for the light is powerful enough to be used in reading sign boards, fixing damaged tires, etc.

The Broughton Steel Blow-Out Boots are used on tires to strengthen weak spots or blow-outs, and by the use of several at a time they are claimed to prevent the car from skidding.

Steel blow-out boots are designed only for clincher tires and fasten under the clincher edge of the rim. They are made entirely of metal, presenting a smooth



surface to the road, while provision is made in the side members for adjusting the boot to different sized tires. Placed close together they form a protection for a blow-out, enabling the motorist to drive the car, even when a bad blow-out has occurred.

Manufactured by George H. Broughton Co., 256 Michigan Avenue, Buffalo, N. Y. Prices on request.



The Anthony Tire Pump has been placed on the market to meet the demand for a first class, single-acting, single-cylinder pump. With this type of pump it is claimed that the tire can be filled with less effort than with other pumps and that the plunger is so arranged that it cannot strike the bottom of the pump cylinder, while the thrust is taken care of by a heavy brass cap. It is stated that the valve cannot stick or leak, thus all of the compressed air is permanently imprisoned, none returning with the upstroke of the piston to waste time and energy in recompression.

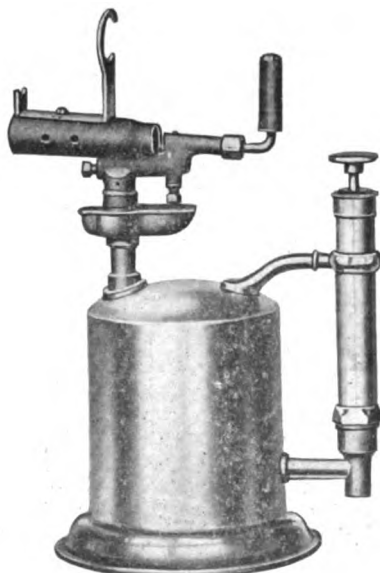
The materials used are of a high grade, such as a hard wood handle, cold rolled steel rod, solid brass fittings, best selected leather, seamless steel barrel, malleable iron base, five-ply rubber tubing and a lever-locking, slip-on tire connection.

Manufactured by the Anthony Co., Long Island City, N. Y. Prices and literature on request.

Vesuvius Blow Torches are made in pint and quart sizes and consist of two lines. The one has a heavy seamless brass tank, and the other a seamless steel tank, which is tinned after fabrication, protecting the steel in a very effective way from coming in contact with the fuel.

A stamped drip cup of ample size and a powerful pump with never failing check valve are features that are claimed to have created the great popularity of the Vesuvius blow torches. The burner head is all brass except the hook, which is made of stamped steel and can be adjusted to take different sizes of soldering or branding irons.

The torch is filled through the bottom, which is shaped like a funnel, making



filling easy. Each torch is tested under a far higher pressure than it would be put to under ordinary use, so that any leaks should develop before it reaches the user.

Manufactured by the American Stove Co., St. Louis, Mo. Sold to the trade through the various divisions. Prices and literature on request.

The Brookins Thief-Proof Tire Lock is designed with the end in view to making it next to impossible for a thief to steal an automobile tire from the tire hanger of a passenger car. The links from which the chain is made are electrically welded from specially heat treated and chilled, non-corrosive steel which, it is claimed, cannot be cut by the strongest bolt cutters, neither can the links be pried apart.



A pure rubber tubing covers the chain to prevent rattling and to protect the enamel finish of the car.

With each chain is supplied a specially designed 24-tumbler lock with hardened shackle, it is stated, which cannot easily be cut. The lock is dust, rust and weather proof and is guaranteed by the manufacturers to be non-pickable, and is stated to bear the indorsement of the Underwriters' association.

Manufactured by the Brookins Manufacturing Co., Dayton, O., Department A. Price at all accessory dealers, \$4.50.

The Natco Cleaning Products include such well known articles as Natco spot remover and cleaner, Natco carbon remover and Natco tar remover. Each article is especially compounded for the purpose for which it is named and is stated to be excellent for that purpose.

The Perfect cleaner and spot remover is claimed to easily remove oil, grease, tar,



paint, varnish, chewing gum, candle grease, etc., from cloth and fabrics without damage or injury to them.

Natco carbon remover is stated to remove all carbon from the combustion chambers of the internal combustion engine, and is guaranteed not to injure the metal, or to impair the lubricating oil, as it will not mix with or dilute engine oil.

Natco tar remover is a positive solvent for tar and oil and is guaranteed to remove all tar or road oil from the finished surfaces of the automobile without injury to the paint or varnish.

Manufactured by the Natco Cleaner Corporation, Madison Avenue, corner 136th Street, New York City. Prices and literature on request.



## Tarvia will save the country's roads—

ALL over the United States there are thousands of road commissioners facing the prospect of having to build new roads at the present high cost of construction.

And all around them are miles and miles of old gravel and macadam roads, not in themselves equal to traffic conditions, but which can be made serviceable if they are repaired and given a Tarvia treatment.

Some Michigan roads, illustrated herewith, show how easily and economically old roads can be salvaged with Tarvia.

One road, for instance, was so bad that the Township Board de-

cided the only thing to be done was to rebuild it at the cost of a new road, but after seeing results obtained on other roads, decided to patch and treat with "Tarvia-B" and stone chips, and—"the road is better than when new" they say.

It is just as easy for your community to beat the high cost of new roads by saving and restoring your old ones. It is almost a crime to neglect your old roads and let them go from bad to worse, when Tarvia treatment can be applied so easily and cheaply.

Tarvia is a coal-tar preparation for restoring old roads and building new ones. With it you can also widen your narrow roads by

adding Tarvia macadam shoulders. It provides a smooth, dustless, mudless, waterproof, traffic-and-frost-proof roadway at moderate first cost and with the minimum upkeep expense.

"Tarvia-KP" is a cold treatment for patching existing roads of every type. It fills up worn places, restores broken shoulders and edges and keeps the road always at the top notch of condition.

Let our engineers advise you how to salvage your old roads with Tarvia, at very attractive costs.

Illustrated Booklets free on request

# Tarvia

Preserves Roads—Prevents Dust

### Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write our nearest office regarding your road problems, the matter will be given prompt attention.

New York	Chicago	Philadelphia	The Barrett Company	Boston	St. Louis	Cleveland
Cincinnati	Pittsburgh	Detroit	Toledo	New Orleans	Birmingham	Kansas City
Minneapolis	Dallas	Nashville	Columbus	Syracuse	Seattle	Peoria
Atlanta	Duluth	Salt Lake City	Richmond	Bangor	Washington	Johnstown
Lebanon	Youngstown	Milwaukee	Latrobe	Elizabeth	Buffalo	Baltimore
THE BARRETT COMPANY, Limited,	Montreal	Toronto	Winnipeg	St. John, N.B.	Halifax, N.S.	Sydney, N.S.
			Vancouver			



Monthly

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\$2 the Year



A Tractor Journal  
devoted to the  
tractor industry and trade



Published by

The Automobile Journal Publishing Company  
PAWTUCKET, RHODE ISLAND

## GREB RIM TOOL



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

**DO THE SENSIBLE THING.**

Provide yourself with the best rim tool on the market and save time, trouble and rims.

### GREB RIM TOOL

You can quickly expand or contract any make of cross-split demountable rim—the Greb is universal and takes them all, especially the Kelsey.

**TEN DAYS' TRIAL.** If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

## METZ Master Six

The car of the Year

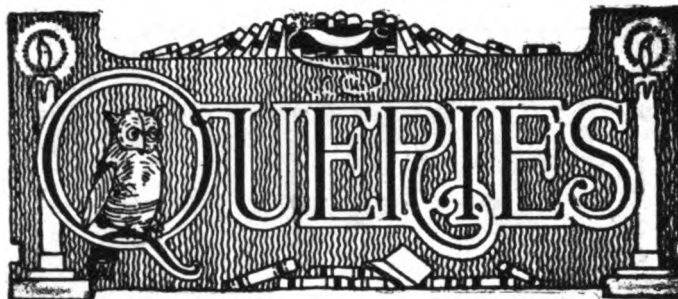
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Honest through and through

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EQUIPPED

We are now extending our agency list  
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**METZ SALES CORPORATION**  
BOSTON, MASS.



### COURTESY APPRECIATED.

Ballard Vale, Mass.  
July 21, 1920.

Mr. E. E. Rhodes, Mechanical Editor,  
Automobile Journal Publishing Co.,  
Pawtucket, R. I.

Dear Sir:—

I have your letter of July 19th in answer to my inquiry regarding motor numbers of motorcycles. I am very much indebted to you for the information contained, which is just what I desired. I appreciate the fact that you went to considerable trouble to secure this information for me instead of referring me to some other party and letting it go at that.

Thanking you for your kindness in this matter and assuring you I shall not forget the same, I am

Yours truly,

ALBERT E. CURTIS.

### DIFFERENCE BETWEEN MAGNETO AND DYNAMO.

(H. R., Kansas City, Mo.)

Will you please tell me the difference between a magneto and a dynamo such as is used for charging a storage battery? Can a magneto be used for charging a battery and is it as dependable as a dynamo? What provision is made for controlling the current from a magneto? Is the current from a magneto always alternating?

A magneto is a small dynamo, generating alternating current. Magnetos are divided into two classes, low and high tension. The high tension is practically a low tension magneto fitted with a secondary winding or coil which transforms the current to a higher voltage in order that it may be high enough tension to enable the spark gap to be jumped. There is no current controlling device on a magneto and the current is variable as regards both voltage and amperage, depending upon the speed of the armature. A magneto could not be used by itself for charging a storage battery.

A dynamo generator, such as is usually used for charging storage batteries, is equipped with a voltage regulating device and a cut-out, which is so arranged as to disconnect the line when the generated current falls below a certain point. Such a device is necessary or the battery current would run back through the dynamo as soon as the generated current fell below the battery current. The voltage regulating device is designed to prevent the generation of excess current such as would result from excessive armature speeds. By these two devices the current is held within certain bounds.

In order to use the current from a magneto for charging a storage battery it would be necessary to rectify or change it to direct, then provide some means for controlling voltage.

### CRACKED CELL IN BATTERY.

(H. S., Brookline, Mass.)

Kindly inform me, through the columns of the Journal, what is the matter with my battery, which is an Exide 6-volt. If I place it upon a table or newspaper, I find that the table or newspaper is stained after the battery has stood upon it for a while. After washing the outside of the battery with a weak ammonia solution. I took it to a battery repairer, who flushed and charged it. Later I placed it upon the paper again with the same results and two weeks after charging the water was low in two of the cells. Would you kindly tell me the reason for this?

(When Writing to Advertisers, Please Mention the Automobile Journal.)



# ZENITH CARBURETOR



**THE  
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From the description which you give it is quite evident that you have one or more cracked rubber cells, allowing the electrolyte to escape from them. These cracked jars should be given immediate attention as the plates will be destroyed if they are not kept covered with electrolyte and we would advise that you immediately put your battery in the hands of a competent battery service station handling your particular make of battery.

### ENGINE RUNS IRREGULARLY.

(C. J. W., Manchester, N. H.)

I have a 1917 Studebaker Six and am at a loss to know what makes it jump and jerk while running along the road. The effect seems like something grabbing the car suddenly and holding it back at short intervals, which is most noticeable at slow speed. Some garage repairers claim it is caused by faulty ignition, or weak valves, and others that it is faulty carburetion, but I am satisfied that it is none of these as the engine seems to run fairly smooth. I thought it was perhaps due to low grade gasoline and engine trouble, as I can only get eight miles to the gallon.

Your trouble is no doubt caused by a combination of ignition and carburetor defects, and the proper course to follow is to first have the valves ground by some competent mechanic unless this has recently been done. Examine the breaker points in the breaker box under the distributor and note whether or not they are pitted. Possibly your condenser is punctured, and the excess current, instead of being absorbed by the condenser, will be found to be pitting the points as it arcs across. File the points carefully to remove the rough metal, taking off the smallest amount possible to get the result. The points should fit square when they make contact, having a smooth surface between them. If the condenser is under suspicion through the points being badly burned, have a competent repairer remove it and fit a good

condenser in its place. Set the points so that they will clear about .015 inch or about 1/64 inch in fractions.

The points should be cleaned thoroughly with a cloth dipped in gasoline and the points washed off. These points should not be changed unless the fault cannot be found elsewhere. They are set correctly at the factory and unless burned or badly pitted will not need changing.

Feel of the terminal wires where they fit into the top of the vulcanite cover of the distributor case; if they fit loosely, or are oil soaked, remove them, wipe dry and replace, setting up tight with whatever fastening means are found.

As nine out of 10 times ignition causes irregular action, the carburetor is rarely at fault and should be left for examination till the last. The plugs should be examined for broken porcelains, sooted plugs, or spark gaps that are too wide; if found defective or the plug is sooted, they should either be replaced with new or cleaned. Porcelains that show cracks should be replaced, while fouled plugs should be taken apart, if possible, and cleaned. When assembling the plug set the points so that you can just pass a worn dime between them; this will be slightly less than 1/32 inch and is about correct for this type of plug.

If the irregular action continues after these units have received attention, it is wise to look to the carburetor for the trouble. Most of this trouble occurs with the engine running at slow speed, you state. This would indicate that the low speed setting of the carburetor was improperly adjusted, and that you were either getting too much or too little gasoline. Too much gasoline in the mixture is indicated by a heavy black smoke issuing from the exhaust and also a strong acrid smell. This would partially account for the low mileage obtained to the gallon of gasoline, while too weak a mixture would be indicated by a popping sound in the carburetor when the throttle is opened suddenly to speed up the engine, and the engine would seem to lag, running irregularly. The needle valve should be set at such a point that the engine idles perfectly, without skipping and with the spark retarded. Adjusting the air spring by means of the adjusting screw

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puts more tension on the spring and valve, making it possible to speed up the engine quickly without the popping sound in the carburetor. If you do not feel competent to do this work yourself, let some carburetor expert do it for you, as he should be able to get satisfactory results.

### CARBON TROUBLE.

(E. M. W., Philadelphia, Pa.)

I have a Willys-Knight 1916 car which has been driven about 13,000 miles and until the last few months seemed to improve with use, the engine developing plenty of power at all times, but of late a decided knock is in evidence, which is helped in a measure by retarding the spark. The loss of power and pick-up are very noticeable, making driving very unsatisfactory. The engine also smokes badly, while the spark plugs fill up with soot quickly; one plug in particular looks as though oil was working by the piston. Never had a moment's trouble with the engine and no mechanic has ever given it any attention.

Your trouble is apparently caused by carbon deposits in the combustion chambers. After 13,000 miles of use, even with a Knight engine, it is not to be wondered at that carbon should bother. Many different grades of oil have necessarily been used, with the result that carbon will accumulate faster with some than with others. Carbon in the ring grooves of the pistons and between the sleeves improve the power of the Knight engine the more the engine is used. But carbon in the combustion chamber is of no advantage in the running of the engine and if allowed to collect for a long enough period will eventually cause pre-ignition. Retarding the spark will cause the pre-ignition knock not to be heard, but as soon as the spark is advanced it will be in evidence again. Clean out the carbon by removing the engine head, or burning with oxy-acetylene gas will remove it.

Loss of power can be explained by the fact that you have been driving with a retarded spark, while the spark plug which shows oil plainly has not been firing. Either one or both of these units will cause the loss of power. Remove the plug in question and fit a new one preferably of the same make, adjusting the points about 1/32 inch apart or a trifle under this figure if necessary to get a steady spark when the engine is running. After the carbon has been removed from the combustion chamber, clean the remaining spark plugs, setting the points correctly. We believe that this will eliminate your trouble, and cause the engine to again develop its original power. If not, take it to your nearest Willys-Knight service station, as other reasons may be causing the trouble, which it would be difficult to locate without seeing the car.

### SHOCK ABORBER FOR CHEVROLET 490.

(F. G. H., Cleveland, O.)

Kindly tell me where I can obtain a suitable shock absorber for my Chevrolet model 490. Also how I can stop the tapping noise at the base of the push rods; it is not a valve tap, but comes from the clincher-like guides at the bottom of the push rods.

Shock absorbers for the model 490 Chevrolet may be obtained from the following manufacturers: Stewart Manufacturing Co., 1536 Franklin street, Oakland, Cal., "Hood Shock Preventer" for Chevrolet; Landis Engineering & Manufacturing Co., 231 Ringgold street, Waynesboro, Pa.; "Landis Shock Diffuser;" Houde Engineering Co., 1399 West avenue, Buffalo, N. Y., "Houdaille Hydraulic Suspension;" International Metal Manufacturing Co., Wayne Junction, Philadelphia, Pa., "Yankee" for Chevrolet; H. W. Johns-Manville Co., 296 Madison avenue, New York City; J. S. Lang Engineering Co., 5 Park square, Boston, Mass., "Chevrolet."

The noise which seems to come from the tappet guide can be temporarily eliminated by pinching the guide closer to the rod, but permanent stoppage of the noise can only be made by fitting a new lifter at the end of the tappet. The engine knock which you mention is probably caused by a loose bearing. Sound will travel quite a distance through metal and although the sound seems to come from the timing gears, it is more likely in the bearings of the crankshaft. Better have the base removed, the bearings examined and tightened if necessary.

**SECOND SPRAY NOZZLE FILLED UP.**

(L. W., North Attleboro, Mass.)

Have been having considerable trouble with my Country Club engine, especially above 20 miles per hour. Some time ago I tried one of the so-called preparations that are guaranteed to remove carbon from the engine while driving on the road. The directions claimed that the preparation, which was in liquid form, was to be put in the tank with the gasoline, and fed into the carburetor through the fuel line. At first it worked fine and seemed to do the work for which it was intended. But of late something acts as though it were stopped up. Have removed the vacuum tank, cleaned the strainer, valves, etc., cleaned the feed pipe to the carburetor and the strainer at the end of the pipe where it adjoins the carburetor, but the trouble still persists. Can you tell me what is the cause of the trouble and how it can be overcome? Have drawn out the gasoline containing the carbon remover and filled the tank with fresh gasoline. The carburetor is a Tillson.

Your trouble is caused by the second spray nozzle in the carburetor becoming filled up with either sediment or the opening in the top being sealed with the carbon remover. Remove the nut on the under side of the carburetor marked drain-out plug in the diagram showing the carburetor in the instruction book and run a fine wire up through the nozzle, till the end of the wire touches the air valve. You can tell this by the sound of the wire as it hits the valve. This nozzle is slotted in the lower end and is fitted with a fine opening in the top, which allows the gasoline to enter the air passage from the hot air stove which surrounds the exhaust pipe. The flow of gasoline is controlled by the speed of the engine and the suction caused by the pistons which, when they reach a certain speed, pull open the air valve, uncovering the opening of the nozzle and allowing the gasoline to automatically enter the air passage. This accounts for the fact that you could not attain a greater speed than 20 miles an hour, as this nozzle is filled up and the gasoline cannot pass through. Cleaning the nozzle will probably remedy the trouble.

**CAR BECOMES OVERHEATED.**

(J. S., Sugar Notch, Pa.)

My 1917 car overheats by driving. Can you tell me the causes?

We give you herewith a list of the many causes, any of which may cause the trouble.

**Poor Water Circulation**—This may result from an insufficient supply of water in the radiator, a choked up, or caked up radiator. Take radiator from car, flush well with water under pressure if possible, examine connections and in general see that water system is clean. If radiator pipes seem to be filled with sediment, a radiator repair man should be consulted.

**Oiling System Failure**—The oil pump may need repairing, the oil pipes may be clogged up; a stiff piece of copper wire will help clean out small tubes. If oil pump does not work well do not neglect to have it repaired.

**Tight Bearings**—Tight bearings sometimes are the cause of overheating. The remedy is obvious; loosen them.

**Carbon**—Carbon in cylinders retains the heat of explosion and causes preignition.

**Over-retarded Spark**—After starting, spark should be advanced as far as possible at all times, unless engine knocks. Late ignition causes overheating.

**Clogged Muffler**—Muffler should be free from soot and products of incomplete combustion.

All exhaust passages should be clear and exhaust valves should open properly, about 30 degrees before bottom center. Incorrect valve timing will cause overheating.

The distance between the valve stem and the push rod or valve lift should be about the thickness of printing paper when the valves are closed. If the exhaust valve is held open overheating will develop.

Do not race the engine when running on low speeds.

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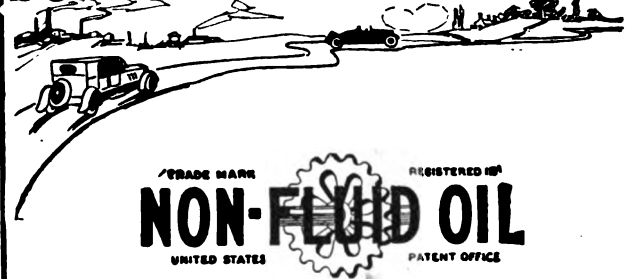
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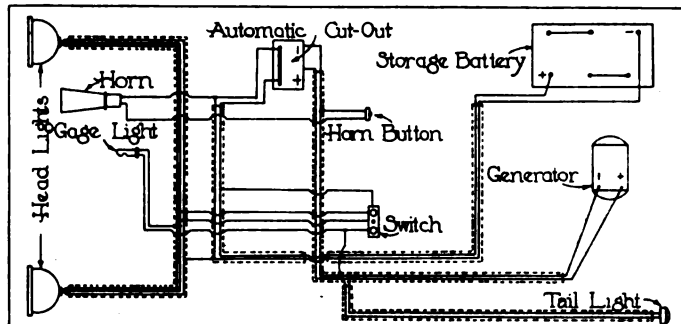
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### CHEVROLET BABY GRAND WIRING DIAGRAM.

(J. W. R., Dorchester, Mass.)

Kindly publish in the Query column of the Journal a wiring diagram of the 1915 Chevrolet Baby Grand.

The 1915 Chevrolet Baby Grand is equipped with the Auto-Lite two-unit, single and double-wire system and which is also the case with the Royal Mail roadster of the same year. The heavy wire connections denote the starting wires



and their connections between the storage battery and the starting motor, through the foot starting button. While the finer lines indicate the paths of the current from the storage battery to the ignition and lighting switch to the lights, etc. Other lines indicate the paths of the current from the generator to the ammeter and storage battery. The diagram is self-explanatory and is easily followed after a little study.

### STARTING COLD MOTOR ON LEAN MIXTURE.

(P. Y. H., Yonkers, N. Y.)

My model 90 — has recently developed a trouble which I believe is in the carburetor. The engine starts nicely, but as soon as I start the car and attempt to feed the gas the engine will choke down, and I have to feed the gas very slowly before it will pick up. This continues until the engine is well heated. After that it works fine, picking up instantly.

Can you suggest the reason for this and the remedy? The carburetor is a Tillson.

Have cleaned the carbon out of the engine and thoroughly cleaned the strainers in the fuel line, but this did not make any improvement.

Your trouble is probably due mainly to using low grade gasoline and is quite a common trouble with all makes of cars, especially if the weather turns cool. The setting of your carburetor needle is for a rather lean mixture during the summer season, to allow your engine to economize on gasoline and the result at starting is, as you state, sluggish at first, with a popping sound in the carburetor till the engine becomes warm, when it operates perfectly to the end of the run. We would not advise you to change this setting of the needle valve during the summer but, when cold weather arrives, you may find that you will have to turn it slightly to the left, to give the carburetor a richer mixture for winter driving. The Tillson carburetor has but one adjustment and that is for the admission of gasoline into the low speed nozzle. A second nozzle automatically supplies air for speeds above 20 miles an hour and does not require adjustment, as it operates by means of a spring actuated air shutter which covers the opening of the nozzle in the air inlet passage. The speed of the engine, above 20 miles an hour, causes a suction in the air passage, opening the air valve, allowing the gasoline to enter the in-rushing air from this second nozzle and gives a correct proportioned amount of gasoline for the higher speeds of the engine.

The proper way to overcome your difficulty is to make use of the choker, after starting the engine and until it warms up. Pushing in the choker rod allows the carburetor to take air, either cold or hot, from the stove which surrounds the exhaust pipe. Naturally this pipe is cold at the start, but rapidly warms as the engine is run. Pushing in the rod gradually for the first few minutes will gauge the mixture from rich to lean, till the rod is in nearly as far as it will go.

With high test gasoline the feature of using the choker would not be so necessary, but with the low grade fuel on the market, much of it containing more or less kerosene, vaporization of the gasoline is very slow, especially when the engine is cold as at the start.



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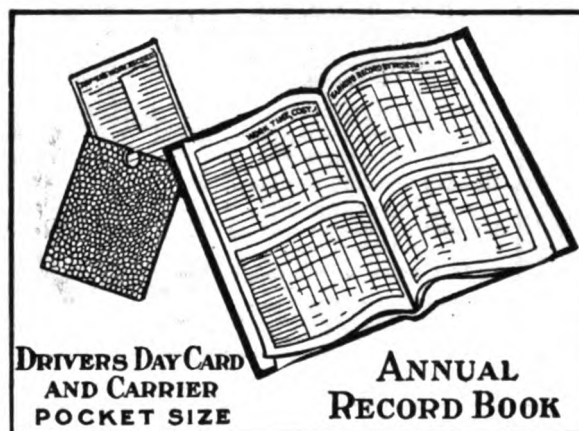
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## SE-MENT-OL ( LIQUID AND POWDER )

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# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., SEPTEMBER, 1920.

NO. 2.

## Important Racing Events of the Early Fall Season

***De Palma Wins the Elgin, Lexington Cars Carry Off Honors in Pike's Peak Hill Climb, and Milton Becomes Premier Racing Driver by Taking Uniontown Track Event.***

**A**MONG the important racing events of the early fall season in the automobile calendar are the 250-mile Elgin road race, the Pike's Peak hill climb and the Uniontown 225-mile track event.

The first, held on Saturday, Aug. 28, was won by Ralph De Palma in a Ballot car, his time for the 250 miles being three hours, nine minutes and 54 seconds, an average of 79.5 miles an hour. Over 70,000 spectators cheered him to victory. He made a non-stop run, leading Milton, who piloted a Duesenberg, over the finish line by one minute and seven seconds. Milton's team mate, Jimmy Murphy, finished one minute and 47 seconds behind the winner, and was 12 seconds ahead of Ralph Mulford's Monroe. Eddie O'Donnell took fifth place.

This year's Elgin road race was, in

many respects, the most remarkable event of its class in the history of automobile racing in this or any other country. Every car that started also finished, not a stop was made by any car for oil, gasoline or tires, and but one forced stop was made in the entire race. On the second lap Gaston Chevrolet's Monroe came to the pits because of a clogged gasoline line, which took so much time to clear that the Indianapolis winner was placed last, outside the money.

Only once did the hard luck jinx, that has turned victory into defeat for Ralph De Palma for many months, threaten the popular driver. On the 20th lap, after having broken all previous records for one circuit of the eight-mile course by seven seconds, the speeding Ballot left the ground on "Airplane Hill" and swerved off the road. Spectators ex-

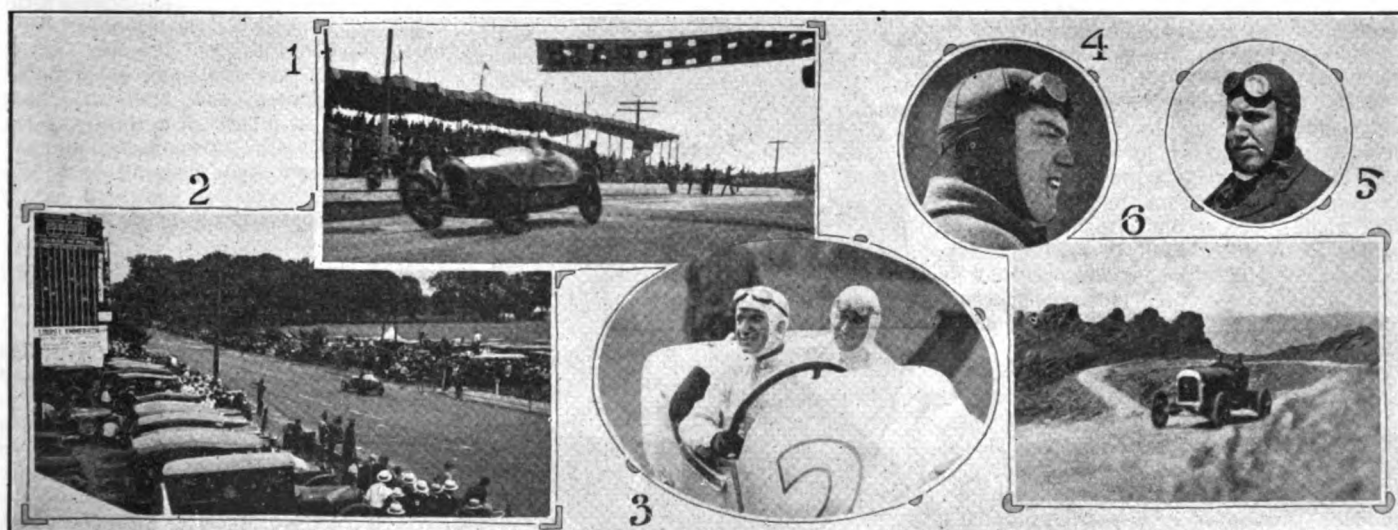
pected to see the car, travelling at an 80-mile clip, crash into the fence, but by a splendid exhibition of driving De Palma brought the car back on the road safely with but five seconds loss of time.

### **Many Records Broken.**

In the course of his remarkable run in this race De Palma broke all lap and track records, lowering by seven seconds the lap record made by the late Spencer Wishart in 1915, and averaging four miles more an hour than Gil Anderson in his Stutz in 1915. Wishart's lap record of six minutes, 18 seconds, was broken four times, De Palma making 6:13 on the 18th lap and 6:11 on the 19th, 29th and 30th.

De Palma's Ballot and Murphy's and O'Donnell's Duesenbergs were all equipped with Goodyear tires.

The Elgin race has a deep signif-



Two Prominent Racing Events of the Early Fall Season: 1, Ralph De Palma Crossing Finish at Elgin Race at a Rate of 81 Miles an Hour; 2, the Grandstand and a Small Portion of the Crowd of 70,000 Who Witnessed the Elgin Event; 3, De Palma, Winner of Elgin Race, and His Mechanic; 4, Al Cline, Second, in the Pike's Peak Hill Climb; 5, Loesche in Winning Lexington, Showing the Winding Course Traversed by Entrants in Pike's Peak Hill Climb.



cance when its bearing on the development of automobile engines is considered. The 183 cubic inch piston displacement engines, with but six cubic inches more displacement than a Ford, not only broke all track and lap records set for the course by motors of 405 cubic inches displacement, but also went through the 250-mile grind without a single engine adjustment.

#### Lexingtons Win Pike's Peak Hill Climb.

Against the largest field of competitors probably ever entered in the National Pike's Peak hill climbing contest, the sport event of the year in its class, two Lexington Thorobred Sport models finished first and second in the free-for-all and took first and second honors in the 300 cubic inch class. The winning driver was Otto Loesche and Al Cline finished second.

The time of the winning car for the 12½-mile climb was 22 minutes and 25 2/5 seconds. Fifteen cars started but only 13 finished. A Hudson finished in 23 minutes and 17 seconds and the Essex in 25 minutes and 56 1/5 seconds.

The average grade of the highway is 7½ per cent. with a maximum of 10 per cent. The course is a series of dangerous turns with hardly a quarter of a mile of straightaway track. The race was run for over half of the distance through a blinding snow and sleet storm and heavy fog. Race officials said that had the weather conditions been favorable the track record established in 1916 would undoubtedly have been broken easily.

Some idea of what this supreme climb means may be gained from the fact that the road rises from an elevation of a little over 5000 feet to 14,109 feet, or practically three miles above sea level in the 12½-mile course.

The two winning Lexington Thorobreds are stated to have been absolutely stock cars in every particular with the exception of being equipped with special bodies.

This gruelling test marks the measure of perfection that has been attained in the development of the internal combustion engine in the way of hill climbing ability, unbelievable reserve power for the crucial moments and remarkable acceleration on the steepest grades.

#### Tommy Milton the Premier Race Driver.

The 225-mile race at Uniontown, Pa., Labor day, was won by Tommy Milton in a Duesenberg car in two hours, 20 minutes, 24 seconds, averaging 96 miles an hour, and his teammate, Jimmy Murphy, was a close second, finishing in two hours, 21 minutes and 27 seconds, an average of 94.8 miles an hour. Eddi-Hearne, who took third money, covered the course in two hours, 24 minutes and 34 seconds, and his average speed was 93.3 miles an hour.

This victory accords to Milton the title of 1920 champion among the drivers of the Automobile Association of America.

The terrific average rate of speed of 96 miles an hour, maintained throughout this race, may be better estimated when compared with the best average time of 89.84 miles an hour made in a race on the Indianapolis, speedway reached by De Palma in the 500-mile



Tommy Milton, Winner of Uniontown Track Race, Becomes America's Premier Driver.

race in 1915 with a Mercedes. Gaston Chevrolet made an average of 88.16 miles an hour in winning the Indianapolis race this year in a Monroe.

#### PRICE OF FORD CARS BACK TO PRE-WAR FIGURES.

The Ford Motor Car Co., Detroit, Mich., has announced a reduction in the prices of all Ford models to figures practically equal to the pre-war list. The cuts range from about 14 per cent. on trucks to 31 per cent. on small models. The former and reduced prices are as follows:

Stripped chassis, from \$525 to \$360. Runabout models, from \$550 to \$395; with starter, from \$625 to \$465. Touring car, from \$575 to \$440; with starter, from \$650 to \$510. Coupe, from \$850 to \$745, including starting system and demountable rims. Sedan, from \$975 to \$795, including starting system and demount-



Jimmy Murphy, Who Took Second Money at Uniontown.

able rims. Truck chassis, from \$640 to \$545, including rims and pneumatic tires. Fordson tractor, from \$850 to \$790.

In regard to this movement on the part of his company, Mr. Ford is quoted as follows:

"The war is over and it is time war prices were over. There is no sense or wisdom in trying to maintain an artificial standard of values. For the best interests of all it is time that a real practical effort was made to bring the business of the country and the life of the country down to normal.

"Inflated prices always retard progress. We had to stand it during the war, although it wasn't right, so the Ford Motor Co. will make the prices of its products the same as they were before the war.

"This in face of the fact that we have unfilled orders for immediate delivery of 146,065 cars and tractors.

"We must, of course, take a temporary loss because of the stock of materials on hand, bought at inflated prices, and until we use that stock up we will have to submit to a loss, but we take it willingly in order to bring about a going state of business throughout the country.

"There is a lull in general business; we are touched by the waiting period that always precedes a reaction; people in every walk of life are waiting for prices to become lower. They realize that it is an unwholesome, unnatural, unrighteous condition of affairs, produced by the war. It is one of the penalties civilization pays for war. In every line of activity there is a growing idleness because the demand is not there.

"There will be no change in wages."

#### NEW CARBON BRUSH CATALOGUE ISSUED.

The National Carbon Co., Cleveland, O., now has ready for distribution to the trade its new motor and generator brush catalogue, No. 35, in which the well known line of Columbia Pyramid carbon brushes is described and illustrated. This catalogue is designed to assist the operator, as well as the engineer, to a better understanding of brushes and, in preparing it, the problems of manufacturers, designers and operators have been borne in mind. Moreover, the National Carbon Co., through its engineering department, will be glad to supply any further information desired in regard to any particular grade of its product.

#### McFARLAN AUTO CO. SUCCEEDS SIX SALES CO.

The McFarlan Automobile Co., New York city, has succeeded the McFarlan Six Sales Co. in the distribution of McFarlan cars, and is now under the management of Winfield Graham, who is secretary and treasurer of the new company. He was formerly sales manager of the McFarlan Motor Co., Connerville, Ind. The New York McFarlan Co. has moved its headquarters in that city from 1655 Broadway to 69th street and Broadway.



## Paige Offering a New Series of Large Six Models

**T**HE Paige-Detroit Motor Car Co., Detroit, Mich., has production well under way on the new series of Large Six models. This new series is appearing on a chassis which shows considerable variation from the preceding design of the Large Six model, being in fact a larger edition of the Paige 6-42 model. The prominent feature is an L-head, six-cylinder, Continental motor with a four-bearing crankshaft, aluminum crankcase and detachable head, with bore and stroke of 3 $\frac{1}{4}$  by five inches, giving an S. A. E. rating of 33.75 horsepower. The power curve of this motor, as tested on the block, shows the following range of operation: At 800 revolutions a minute (a driving speed of 18 miles an hour), 29 horsepower is developed; at 1800 revolutions a minute (40 miles an hour), 62 $\frac{1}{2}$  brake horsepower is developed, while at 2300 revolutions, corresponding to a road speed of 51 miles an hour, 70 brake horsepower is obtained. At low speeds in high gear it is said to show an acceleration of five to 25 miles an hour in eight seconds, road

bodies is a three-piece windshield with a solid aluminum frame to carry both the front vision glass and the triangular side wings.

A second cowl is fitted at the back of the front seat on both of the open models. In the seven-passenger, known as the Lakewood model, this second cowl carries the two extra tonneau seats when folded, as well as a tonneau light. The space in the sport model is used for two nicely built lockers provided with keys. On both cars the tonneau light is furnished with a cord on a spring reel and may be removed from its socket to serve as a trouble lamp.

### The Sedan Model.

The sedan body on the same chassis is a seven-passenger model, finished in brown broadcloth with vanity case, smoking set and window moulding finished in walnut. All windows are fitted with mechanical lifts. Besides a dome light, dash light and rear quarter reading lights, there is a step light at the bottom of the right rear door. A cowl ventilator for the front seats and a heat-

Lubrication—Automatic, adjustable, pressure feed by gear pump; oil forced to crankshaft and connecting rod bearings; camshaft, timing gears and cylinders lubricated by splash.

Cooling—Water forced circulation by centrifugal pumps; thermostatic regulation of temperature; ball bearing fan; V-type cellular radiator; capacity of system, 5 $\frac{1}{2}$  gallons.

Carburetor—Rayfield, top outlet, water jacketed and fitted with hot air intake and dash adjustment.

Starting—Gray & Davis separate starting generator with third brush regulation.

Lighting—Gray & Davis separate generator with third brush regulation.

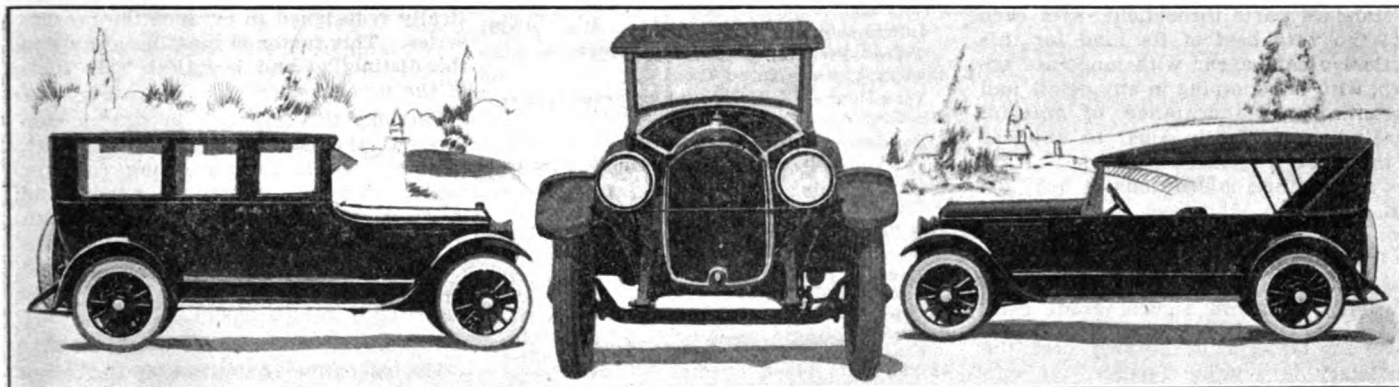
Ignition—Atwater Kent high-tension distributor with automatic spark advance; Willard 111-hour, rubber insulated, six-volt battery.

Clutch—Borg & Beck, 12-inch, three-plate dry clutch.

Transmission—Conventional, three speeds forward and reverse; special Paige transmission lock, integral with cover plate, thief proof, controlled by Yale cylinder.

Propeller—Tubular shaft with Spicer universal joints.

Rear Axle—Floating type Hotchkiss drive; pressed steel housing; spiral bevel driving gears; differential mounted on



Typical Models of New Large Six Series Made by Paige-Detroit Motor Car Co.

speeds being obtained with a rear axle gear ratio of 4.55 to one.

Both the main and connecting rod bearings are lubricated under pressure from a gear driven oil pump. A thermostat is fitted to insure the quick warming of the motor and to maintain a uniform temperature. Drive is through a Borg & Beck 10-inch, three-plate, dry clutch and a Paige transmission in a unit with the engine. The patented Paige transmission lock is continued. A tubular drive shaft is used, fitted with Spicer universals at front and rear. Hotchkiss final drive is also employed through 61 $\frac{1}{2}$  by 21 $\frac{1}{2}$ -inch semi-elliptic springs with a Salisbury floating rear axle.

### Three Bodies Fitted.

Three bodies are fitted to this new chassis, four and seven-passenger open and a seven-passenger sedan. The lines of the familiar Paige hood have been somewhat altered. The radiator has been raised a trifle, though the V shape is retained. From the corner of the radiator shell a straight line has been carried back, forming the top of the body sides on the open models, giving a straight-forward, clean-cut effect. Immediately noticeable on these new open

er in the tonneau floor are standard equipment. Macbeth lenses are provided for the head lights.

Firestone cord tires, 33 by 4 $\frac{1}{2}$  inches are fitted on all three models. The standard finish is Paige blue with black leather upholstery on the open car. An alternative color scheme is offered for the four-passenger Larchmont II model, moleskin gray deep being used as a body color, with rich deep pencil-grained, genuine leather upholstery.

### Detailed Specifications.

Following are the specifications and mechanical details of the Paige model 6-66:

Motor—Six-cylinder, special gray iron, cast en bloc, with detachable head, 3 $\frac{1}{4}$ -inch bore, five-inch stroke; aluminum crankcase, pressed steel oil pan.

Crankshaft—Four-bearing, drop forged, heat-treated and ground; four large main bearings, 2 $\frac{1}{2}$  inches in diameter.

Connecting Rods—I-beam section, .35 carbon steel, heat treated.

Camshaft—Carbon steel forging, integral cams, hardened and ground; four large bearings.

Valves—Right side of motor; heads are nickel steel welded to .20-.30 carbon steel stems; valve mechanism fully enclosed and lubricated.

Timken bearings, pinion shaft on Hyatt and double-row ball bearings, and rear wheels on double-row ball bearings; axle shafts removable without disturbing wheels; gear ratio, 4.55 to one.

Brakes—Two sets working on steel drums, 14 inches inside diameter, 14 5/16 inches outside diameter; brake bands have two-inch face.

Front Axle—Drop-forged, I-beam section, heat treated; Bock roller bearings for front wheel spindles.

Springs—Special high carbon steel; front, semi-elliptic, 40 by two inches; rear, semi-elliptic, 61 $\frac{1}{2}$  by 2 $\frac{1}{2}$  inches.

Steering Gear—Jacox, adjustable. 18-inch wheel with corrugated inside rim; horn button in center of wheel; turning radius, 22 feet.

Fuel Supply—23-gallon tank at rear, protected by rear frame cross member; Stewart vacuum feed to carburetor.

Wheelbase—131 inches; standard tread, 56 inches.

The Wheeler-Schebler Carburetor Co., Indianapolis, Ind., has completed its new office building, which is 108 by 115 feet, three stories high. The first floor is occupied by the engineering staff, experimental room and laboratories, and the entire second floor by general offices. This new administration building is modern in every respect.

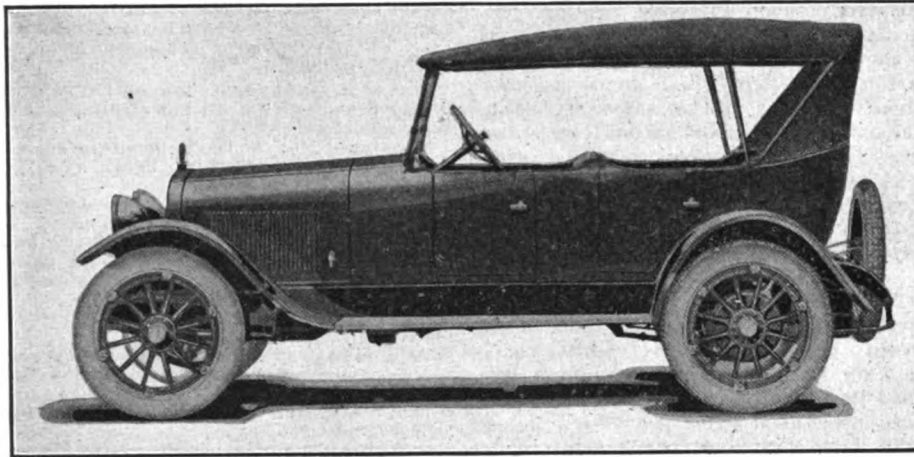
## Stanwood Motor Car Co. Offers New Six

**I**N OFFERING the Stanwood Six car to the public, the manufacturer, the Stanwood Motor Car Co., St. Louis, Mo., states that its ideal and purpose realized in this product, were to build a

Brakes—Service and emergency, 14 by two-inch.

Springs—Front, Perfection, 38 by two-inch; rear, 57 by two-inch.

Frame—Hydraulic pressed steel, 7½-inch channel with two-inch flanges.



New Stanwood Six Five-Passenger Touring Car Made by Stanwood Motor Car Co. St. Louis.

car of medium size and weight, composed of standard parts throughout, with each part the very best of its kind for this particular car—a car with moderate upkeep, with no skimping in any detail, and presenting an appearance of graceful sturdiness and finish equal to any car on the market, regardless of price. It offers no startling innovations in body design, although approved modern lines have been carried out. In construction, the frame work of the body is heavy and substantially made, it is stated, such as is usually found on highest grade cars.

The top material is the very best, the upholstery is genuine leather, the curtain work is unsurpassed and all parts have been selected with an ample margin of safety to take up accidental and unusual strains. Other qualities noted are its easy riding, perfect balance, so that skidding and side-slipping are reduced to a minimum, brake construction which affords a straight pull with no jumping of the brake pedal from the action of the axles on the rear springs and accessibility of components.

It is offered at present in five-passenger touring model.

Following are the detail specifications:

Motor—Continental Red Seal, six-cylinder, 3¼ by 4½ inches.

Lubrication—Full pressure feed with drilled crankshaft and gear type oil pump.

Cooling—Centrifugal water pump.

Carburetor—Stromberg.

Fuel System—Stewart-Warner vacuum feed with 20-gallon tank in rear.

Clutch—Borg & Beck 10-inch.

Transmission—Grant-Lees selective, three speeds and reverse.

Starting and Lighting—Westinghouse two-unit.

Ignition—Atwater Kent.

Battery—Willard, six volts.

Radiator—Honeycomb type.

Drive—Hotchkiss.

Axles—Standard parts; front, drop-forged I-beam No. 2550, equipped with Bock roller bearings; rear, semi-floating, No. 2550, equipped with Bock roller bearing, pressed steel housing.

Wheels—Wood, artillery type, demountable rims.

Lubricating System—Alemite.

Tires—Firestone, 33 by four-inch, non-skid rear, plain tread front.

Tire Pump—Kellogg, driven from transmission, with floor board control.

Fenders—Eleven-inch, full crown.

Steering—Gemmer, irreversible, with 18-inch walnut wheel.

Windshield—Slanting adjustable, rain vision.

Body—Five-passenger, stream line.

Horn—Klaxon 12.

Headlights—Duplex.

Top and Curtains—Neverleak deluxe, double thickness, door opening curtains.

Finish—Radiator shell, fenders and splash pan, black enameled body, Brewster green, upholstered in genuine No. 1 long-grain leather.

Wheelbase—118 inches.

Weight—2900 pounds.

Equipment—One large oval plate glass window in rear curtain, Motometer, Rex tonneau light, foot rest in tonneau, robe straps, set of tools, jack, extra rim and tire carrier.

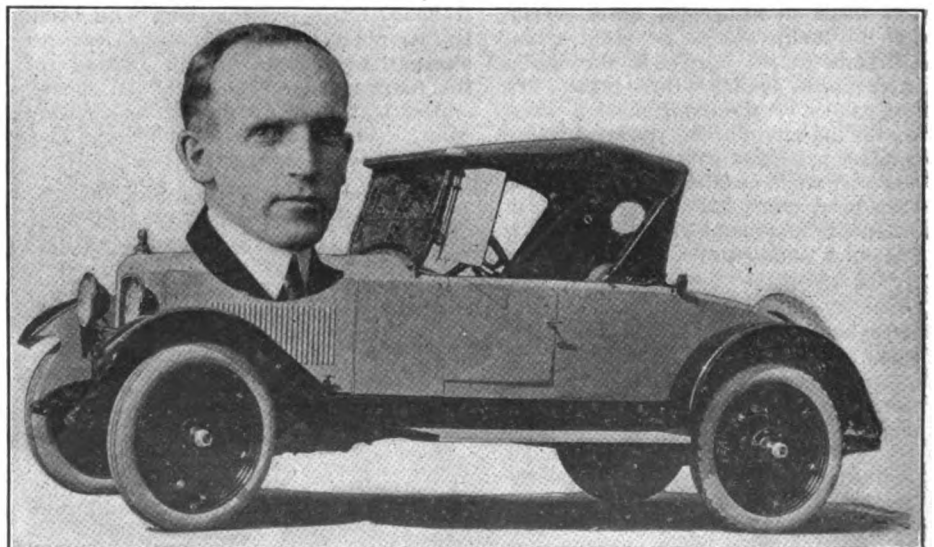
## GRANT BRINGS OUT NEW SPORTING ROADSTER.

The announcement of the association of George C. Hubbs, with the Grant Motor Car Co., Cleveland, O., as vice president and general manager, following so soon after the purchase of the H. J. Walker Motor Co. by the Grant interests, confirms the opinion that the Grant Co. is preparing itself for increased production and sales to take a much more prominent position in the automotive industry. Before accepting this connection Mr. Hubbs had been for six years assistant sales manager with the Dodge Brothers organization.

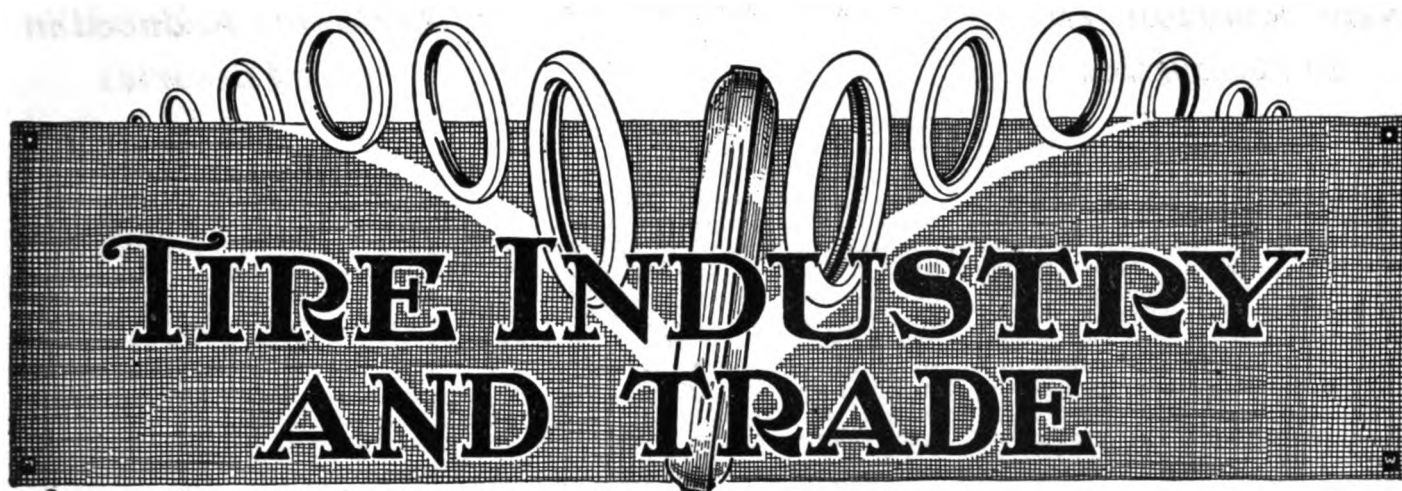
It is announced that the present model of the Grant Six, which appeared a year ago, will be continued substantially the same for several years to come, with minor modifications in the way of refinements and, making due allowances for the general increase in motor car prices since 1917, the present model is in a price class distinctly higher than the Grant cars which preceded it. The overhead valve motor is of Grant design and manufacture and is stated to be of considerably higher rating than its predecessors, and the whole chassis was practically redesigned to produce the present series. This factor is most noticeable in the distinctive and beautiful body lines of the present car.

Carrying the emphasis in style a step forward, the Grant Co. is bringing out, this month, a new sporting roadster model. This is offered in a new and striking color scheme for the body, with fenders in black and black disc or wire wheels. Johnson windshield wings and other smart touches make this roadster a distinctly rakish model.

The executive committee of the Associated Advertising Clubs of the World has set the date for the next international convention for the week of June 12, 1921 at Atlanta, Ga. H. H. Charles of New York city has been elected a vice president for the Second District, to succeed Rowe Stewart.



New Sporting Roadster Brought Out by Grant Motor Car Co., Cleveland, O. Insert Shows George C. Hubbs, the New Vice President and General Manager of Company.



# TIRE INDUSTRY AND TRADE

## *Polack Sells to Buckeye Rubber Co.*

The Polack Tyre & Rubber Co., 1876 Broadway, New York City, with factories at Bridgeport, Conn., has been purchased by the Buckeye Rubber Products Co., Cleveland, O., and the directors and management of the latter company have assumed full charge of the manufacture and sale of Polack tires through established outlets.

The Polack tire business, which last year amounted to about \$960,000, will occupy about 20 per cent. of the factory space of the Buckeye Co., and C. H. Roth, president and general manager, states that the same high quality that has always distinguished Polack tires, will be scrupulously maintained. In order that there may be no interruption in the business of the Polack Tyre & Rubber Co., it has been arranged for the Bridgeport plant to continue in operation until the Willoughby plant, of the Buckeye Co., in which Polack tires in all sizes will be made in the future, is in a position to start production.

## UNITED STATES TESTS OF PNEUMATIC TIRES.

"Another indication of the growing demand for pneumatic tires on trucks is noted by tire manufacturers in a series of exhaustive tests recently conducted by the United States Bureau of Public Roads," says H. A. Githens, general sales manager of the Federal Rubber Co., Cudahy, Wis. "The Highway Bureau, in these tests, sought the real cause of road wear, and the reports, which appear in the official Public Roads Bulletin, say that road impact is the real cause of road wear. The tests, after this was determined, were centered on the determination of the causes of road impact.

"It was shown that unsprung weight is the controlling factor in road impact. It is the truck that hits the road a direct, solid blow, undiminished or uncushioned, that does the damage. Truck and tire manufacturers see in the report an indication of the trend towards the pneumatic truck tire. The need for saving

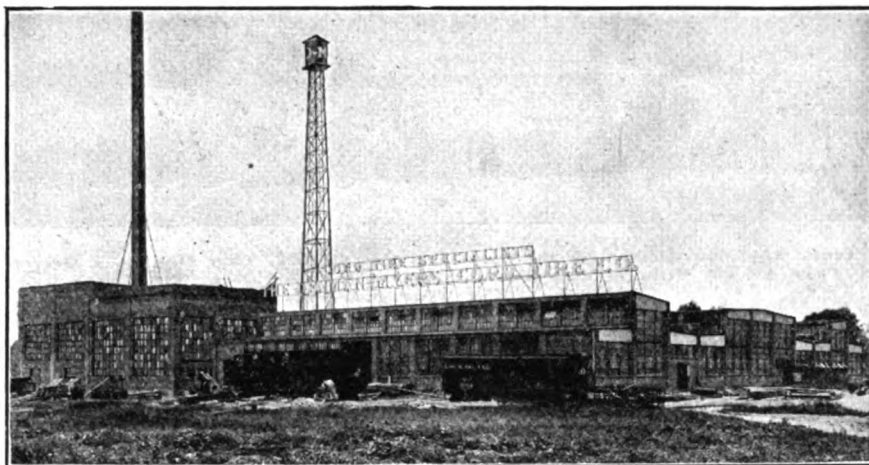
the highways of the country was never so important as now. In 1919 motor trucks handled 300,000,000 tons of material. At least three times in 1920 the motor truck has saved the nation's transportation system from utter collapse. The tonnage hauled by motor trucks in 1920 promises to greatly exceed that of the previous year.

"Legislators, highway engineers and those intimately concerned with motor vehicle manufacture see the need of not only more and better constructed roads—roads constructed with motor truck traffic in view—but they see also the necessity of taking every precaution possible to save our present roads. No other single factor, I believe, will do as much

## *Denman Tires Being Built at Warren, O.*

Sept. 15 marked the beginning of increased production of Denman cord tires, as on that date the Denman-Myers Cord Tire Co. put into production its new plant at Warren, O., which is considered one of the most modern, scientifically equipped and best planned tire manufacturing factories in the country.

The company was one of the very first to be organized for the exclusive manufacture of cord tires, and Walter R. Denman, secretary and general manager of the company, is probably one of the



New Factory of Denman-Myers Cord Tire Co. at Warren, O.

to save roads and further the cause of good roads as the pneumatically tired motor truck. It is of equal importance with the redesigning of trucks to meet new road and load conditions.

"To talk of restricting truck traffic is about as sensible as it would be to try and restrict the railroads to certain service. The motor truck has earned its place in the sun, so to speak, as one of the greatest transportation forces in human existence. But truck operators generally can help in the movement to protect American roads by using pneumatics."

Springfield Tire Co., Springfield Mo., has bought Diamond Tire Co., that city.

earliest tire authorities to foresee the increasing popularity of the cord tire as compared with fabrics. Cord tire specialists are in charge of every department of the factory and a well balanced and practical product is the result.

The president of the company is Walter E. Myers and he states that sales connections are being established throughout the country and that indications point to a very rapid development in the distribution of Denman cords.

James E. Haab, formerly factory representative of the Rubber Products Co., Barberton, O., has been placed in charge of sales in the Northwest district for that company.



## New Amazon Tires in Production

The Amazon Rubber Co., Akron, O., announces that its new non-skid Amazon cord and fabric tires are now in regular production, the outstanding features of which are a change in tread design and an increase in the size of both cord and fabric. In addition to making the treads heavier, the wearing surface has been increased by a change in the design of the non-skid lugs, which are wider and so placed as to present the maximum amount of tread stock in contact with the road surface. Both cords and fabrics are made over-size in accordance with the latest approved manufacturing practise.

Amazon fabric tires are now made in non-skid tread only, except in the 30 by three-inch size, which is available in both plain and non-skid tread. Owing to the decreasing demand for 4½ and five-inch fabric tires, no Amazon fabrics will be furnished above 34 by four-inch. Amazon cord tires are supplied in all the popular sizes, including 30 by 3½-inch



The Truck That Was Driven for the Coast-to-Coast Record, That Has Been Driven More Than 120,000 Miles in Two Years, Showing the Size of the Tires That Made Passenger Car Time Practical.

clinker for Ford and other light cars. Both non-skid and ribbed treads are manufactured in all sizes, except 30 by 3½, which carries non-skid only.

Besides the regular cords and fabrics, the Amazon Co. is specializing on what it calls the Amazon Industrial tire, a 30 by 3½-inch fabric, over-size, with an extra ply of fabric. The company is also continuing the production of Amazon red and gray tubes, the gray for fabrics, and the red will be built over-size and of heavy gauge to properly fit the over-size cord casings.

### New Philadelphia Distributor.

The Amazon Co. announces also that the distribution of Amazon tires and tubes in Philadelphia and adjacent territory has been turned over to the firm of Charles S. Smith, Inc., which has been in this line of business in this district for several years.

J. A. Fullerton has purchased controlling interest in Giant Tire & Rubber Co., Kansas City, Mo.

## MID-WEST MANUFACTURERS' OUTING.

The August meeting of the Mid-West Rubber Manufacturers' association took the form of an outing held at Hotel Breakers, Cedar Point, near Sandusky, O., on the shore of Lake Erie. The programme included a dinner in the hotel pavilion the evening of the first day, with beach sports in the forenoon of the second day, and a business session directly after luncheon, presided over by Theodore E. Smith of the India Rubber Review. Jesse E. LaDow, secretary of the Mansfield Tire & Rubber Co., Mansfield, O., gave an account of his trip to the crude rubber countries of the Far East, and there were remarks by E. S. Babcock of the Akron Advertising Agency Co., J. E. Allen of the Braender Rubber & Tire Co., Rutherford, N. J., H. O'Reardon of "Tires," New York City, O. M. Ragedale of the Hunter Dry Kiln Co., Indianapolis, Ind., and W. F. Harrah of the National-Standard Co., Niles, Mich. The outing committee consisted of H. S. Vorhis, general manager, Mid-West Rubber Manufacturers' Association, chair-

## Accidents Reduced in Tire Factories

According to statistics compiled by the Safety First department of the Goodyear Tire & Rubber Co., 154 married men were injured in the month of July, compared to 123 single men. Another interesting fact established by the Safety First experts is that the percentage of accidents is greater among foreign-born workers. Approximately 10 per cent. of Goodyear employees were born abroad, yet in one month they furnished 20 per cent. of the total number that met with accidents.

As a result of a "Safety First" campaign, extending over a period of three months, it is reported that the number of accidents was cut 30 per cent., and compensation cases 50 per cent. A close tabulation of casualties show that most of them come as the result of carelessness on the part of the workmen. Failure to observe "Safety First" rules sends the greatest number to the hospital, while negligence of fellow-workers accounts for a considerable number.

S. M. Schott of the United States Tire Co., chairman of the rubber section of the National Safety Council, states that his company has, in the course of three or four years made a reduction of 40 per cent. in its accident cases and has made even a better showing on the serious cases. "It is remarkable," says Mr. Schott, "how the rubber companies of the country have been able, by careful attention to safety devices, by education and by revision of manufacturing processes, to cut down the number of serious injuries among their factory workers."

## THREE NEW BRANCHES FOR FIRESTONE.

Announcement of the opening of three new branches for distributing its products to dealers was recently made at Akron, O., by the Firestone Tire & Rubber Co. They are located at Duluth, Minn.; Portland, Me.; and Denver, Col.; and bring the total number of Firestone branches in the United States up to 65. These branches, in turn, are stated to supply more than 47,000 dealers.

It is estimated that the company's sales will reach the \$150,000,000 mark for 1920.

## U. S. INNER TUBE PLANT.

The initial unit of the plant of the United States Compression Inner Tube Co. has begun operations at Tulsa, Okla. The present capacity is 1000 puncture-proof tubes daily. M. C. Hales is president, T. Robertson, secretary and C. R. Porter treasurer of the concern.

## EASTBURN IS REPRESENTATIVE.

L. V. Eastburn has been appointed district representative of the combined Republic and Canton-Blackstone Tire companies with headquarters at 19th and McGee streets, Kansas City, Mo.

## GOODRICH CO.'S BALANCE SHEET.

The balance sheet of the B. F. Goodrich Rubber Co., Akron, O., as of July 28, 1920, shows an increase in current assets to \$104,470,421, as compared with \$887,139,439 at the close of last year. Current liabilities were shown as \$31,902,556, leaving working capital of \$72,567,865, as compared with \$55,951,631 at the close of 1919.

The net profits for the first six months of 1920, after making full provision for maintenance charges, depreciation, interest on borrowed money, doubtful accounts and all outstanding liabilities, but before providing for federal income and profits taxes, were approximately \$7,600,000.

## United States First in Rubber Imports

The outstanding feature of the export trade of the Straits settlements is the premier position held by the United States as a purchaser of Straits products for 1917 and 1918. This is due, to a great extent, to the extensive buying of crude rubber by American manufacturers. The total value of the exports for the year 1917, according to government returns, was \$351,907,446, of which \$117,578,379 went to the United States; the total value of the 1918 exports was \$350,034,651, \$124,070,026 of which went to the United States, while, according to the declared export returns made at the consulates at Singapore and Penang, the American purchases from the Straits Settlements amounted, in 1917, to \$136,036,072, and in 1918, to \$131,241,485. Taking the latter figures as a basis, the United States bought nearly as much of the exported Straits products during the two years mentioned, value considered, as the four other largest purchasing countries, Great Britain, British India and Burma, the Dutch East Indies and Japan combined.

### NOTES FROM THE LONE STAR STATE.

The Continental Tire & Rubber Co., Stamford, Tex., announces that it is to erect a textile plant in that city, to be one of the largest of its kind in the country. The first unit, upon which work will begin immediately, will cost \$500,000. It will employ several hundred hands with an initial monthly pay roll of \$40,000.

Horace L. Blanchette has purchased a controlling interest in the Oriental Tire & Service Co., College and Orleans streets, Beaumont, Tex., and will enlarge the business.

The Rowland Preis Tire Co. has been formed at Beaumont, Tex., to represent the Republic Tire Co. The place of business is at 988 Pearl street.

George Lopez, formerly president of the Great Western Alfalfa Milling Co., of Denver, Col., has organized the United Motor Supply Co. of El Paso, Tex., which has purchased the Two Republics garage at 420 Texas street from Charles A. Barker. In addition to conducting the accessory and tire business carried on by Mr. Barker in connection with his garage, the United Motor Supply Co. has been appointed distributor of the Sampson Super tires for west Texas, the Panhandle, New Mexico and Mexico, and dealers will be appointed throughout that territory.

### CHANGES IN MASON TIRE CO.'S PERSONNEL.

The Mason Tire & Rubber Co., Kent, O., has created, as a part of the factory organization, a factory engineering department with H. W. Sidnell, who has been with the company since its beginning, as manager. He was in charge of the cost department and later assist-

ant secretary and office manager. This new department will have a number of sub-divisions, among them being the planning, tire design and salvage divisions. The planning division will have charge of departmental system, the routing of materials and the factory manual. The tire design department will supervise all specifications and equipment, while the duties of the salvage division will be the collecting, sorting, storage, reclaiming and sale of waste material.

This new factory engineering department will require a force from eight to 10 men when fully organized. Other changes in the Mason Co. personnel incident to the creation of this department include the transfer of E. B. Harvey, now of the cost department, to be manager of the planning division, and W. W. Peffers of the raw material department will also go into the planning division. W. S. Agnst, at present a draftsman, will have charge of the tire design division.

### INCREASED MILEAGE DUE TO BETTER INNER TUBES.

Many phenomenal records of mileage recently obtained from automobile tires are being brought to the attention of manufacturers; in fact, motorists are beginning to take as a matter of course the increased service now being given by these components. One recent testimonial stated that a pneumatic truck tire ran 60,000 miles, and many car owners have obtained from 10,000 to 40,000 miles from one casing.

Fred L. Morgan, manager of tube sales for the Goodyear Tire & Rubber Co., Akron, O., believes that these wonderful mileage records are due to the marvelous strides made in the manufacture of inner tubes. "If the tube isn't built right," he asserts, "the casing will blow out," and force is lent to his statement by factory records which show that only 16 Goodyear tubes out of every 10,000 are returned for adjustment.

### GOODYEAR-EQUIPPED BUSES.

It is reported that more than 1700 tourists have been carried daily through the Yellowstone National Park by the 150 Goodyear-equipped motor buses that are employed in this service. And, while the roads in the park are not paved, they are reported to be good enough to allow visitors to see the marvels of America's "Wonderland," in comfort from these rubber-tired vehicles.

### UNITED STATES RUBBER SURPLUS.

For the six months ending June 30, last, the United States Rubber Co. reports a surplus, after charges and federal taxes, equal to \$13.68 a share or \$81,000,000 common stock, after payment of preferred dividends. This is compared to \$23.01 on \$36,000,000 common stock for the corresponding period last year.

The total sales for the 1920 period were \$129,588,987, an increase of \$30,099,615 over the 1919 period.

## Personals of Automotive Industry

A. B. Way, until recently secretary and general manager of the Bridgeport Chain Co., has become affiliated with the Chain Products Co., Cleveland, O., in the capacity of district sales manager for New England, with headquarters at the company's New York office, 150-152 Chambers street. For many years prior to his identification with the chain industry Mr. Way had been affiliated with various New England manufacturing enterprises, but from the advent of weldless wire chains he has been connected with this industry. During the war he was chosen chairman of the board of weldless wire chain manufacturers.

C. S. Jordan has been made advertising manager of the branch of Hare's Motors of New England at Worcester, Mass., succeeding F. D. Trapp, who has assumed the management of the Bridgeport branch for Hare's Motors of Con-



A. B. Way, New England Sales Manager for Chain Products Co.

necticut. A. T. Schmidt has been appointed service manager of the Worcester branch.

N. T. Albright has been appointed general manager of the Automotive Accessories Co., Kokomo, Ind., and he will also have charge of advertising. Mr. Albright has been with the Pittsburgh Plate Glass Co., Kokomo, in the commercial department for 17 years.

Julius Janes, formerly president of the Standard Steel Castings Co., Cleveland, O., recently concluded an arrangement with the Farrell-Cheek Steel Foundry Co., Sandusky, O., by which he has become the sales representative of the latter concern in Cleveland and Cuyahoga county.

E. R. Creamer has been appointed superintendent and C. S. Ober office manager of the George R. Carter Co., Connersville, Ind.

Herbert R. Small has been appointed manager of the export division of the Traffic Motor Truck Corporation of St. Louis, Mo.

# Notes of the Industry and Trade

## Hares Motors Centralizes Distribution

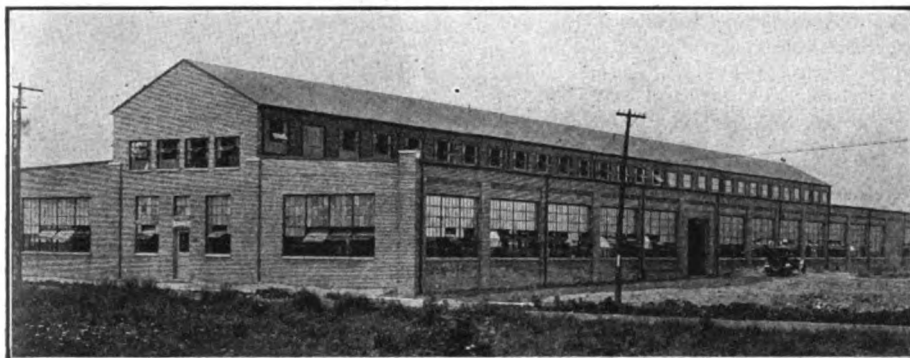
Hare's Motors, Inc., 16 West 61st street, New York City, recently announced another step in the concentration of the distribution of its products, the Locomobile, Mercer and Simplex cars, and the Riker truck. This is the taking over by the Philadelphia branch of the Locomobile Co. of the control of the distribution of the Mercer car, in addition to that of the Locomobile, in eastern Pennsylvania, southern New Jersey and Delaware. This centralizes the merchandising of all Hare's motors products in this territory, and offers to the public a complete transportation service through a single channel of distribution.

The Philadelphia branch is under the management of Oscar Coolican, formerly in charge of the Detroit branch of the Packard Motor Car Co. B. C. Helm, formerly carriage sales manager for the Packard Motor Car Co. of New York and later eastern district manager for the pa-

## NEW VEHICLE MANUFACTURERS AT ELECTRICAL SHOW.

The cars of two makers of electrical motor vehicles, which have entered the field during the past year, will be seen for the first time at the New York Electrical exposition in October. The Berg Electric Car Co. will show a passenger car, while the recently organized Steinmetz Electrical Motor Car Corporation will exhibit an industrial truck and a commercial vehicle.

The automobile exhibits at the Electrical show will be grouped on the 47th street side of the second floor of the Grand Central Palace, and will include the product of practically every electrical vehicle manufacturer in the country. Passenger cars, commercial vehicles and industrial trucks and tractors will be shown. In addition to the Berg and Steinmetz exhibits, displays will be made by the Baker R & L Co., Commercial Truck Co., Oneida Truck Co., Lakewood Engineering Co., Lansden Co., Walker Vehicle Co. and the Ward Motor Vehicle Co.



The First Unit of the New Plant of the Automotive Corp., Toledo, O., Which Was Recently Occupied and Formally Opened to the Public.

rent company, is acting as special representative for the Philadelphia district for Hare's Motors.

It is Mr. Coolican's intention to establish dealers throughout the entire territory, careful consideration being given to their financial standing and capability of their organizations.

### Hare's Motors of Milwaukee.

The organization of Hare's Motors of Milwaukee is also announced, which will control the distribution of the products in Milwaukee and the eastern counties of Wisconsin. The company's headquarters are at 82-84 Farwell avenue and, for the first time in Wisconsin, service on the Locomobile, Mercer and Simplex cars will be rendered under one roof. The personnel of the organization is made up of Milwaukee business men, as follows:

President and treasurer, Harry F. Kreuger; vice president, Julius E. Roehr; secretary, Thomas W. Cushing.

Mr. Cushing has been connected with the sales end of the industry since 1911, selling Cadillacs, Oldsmobiles, Overlands, MacFarlands and Oaklands.

In addition to these booths a part of the third floor has been set aside for demonstration purposes, where industrial trucks and other vehicles will be seen in actual operation.

## NEW FACTORY FOR STAR BATTERY.

The Star Storage Battery Co., Muncie, Ind., recently moved into its new factory, which is equipped with the latest machinery and supplied with every modern appointment and convenience for economical production. The new unit will afford considerably more floor space, increased production facilities being necessitated by the augmented demand for the Star storage battery.

## LUCIA MANUFACTURING CO.

C. H. Whiting, president of the Lucia Manufacturing Co., Inc., Hartford, Conn., announces the resignation of D. A. Goodkind as sales manager, and also that the sales office of the company will be moved from New York city, to the factory, 32 Union place, Hartford, Conn.

## Changes in Prices of Hanson Cars

The Hanson Motor Co., Inc., Atlanta, Ga., maker of Hanson cars, has announced the following price changes to take effect at once:

Touring car and roadsters, \$2365; sport model, \$2465; sedan, \$2885.

It is stated that the increases are made necessary by the adoption of the new style body and the many refinements which have been added to the Hanson Six car, the body, hood, fenders and all sheet metal parts now being constructed of heavy gauge aluminum.

## THIRD EXHIBITION OF ACCESSORIES BRANCH.

The third annual exhibition of the Automobile Accessories branch of the National Hardware Association of the United States will be held in the Coliseum, St. Louis, Mo., Nov. 30-Dec. 3, inclusive, and the outlook is that this will be one of the most interesting features of the convention.

There will be no charge for exhibition space, and the association will furnish and erect rails to divide spaces, signs displaying the name of the associate members exhibiting, chairs, etc., but exhibitors will not be permitted to make display of samples of accessories manufactured by concerns not associate members of the association.

Special rates have been made at the Statler, Jefferson, Marquette and Planters' hotels. The exhibition manager is Robert E. Lee, 3124 Locust street, St. Louis, Mo.

## FORD FOUNDS TECHNICAL INSTITUTE.

The establishment by the Ford Motor Co. of an educational department at Detroit, to be known as the Ford Technical Institute, is reported. This is to rank as a university, empowered to grant degrees in mechanical, electrical and chemical engineering, and complete courses will be made available to the more than 75,000 employees of the Ford Co., without charge. It is stated that this institute will be formally opened this fall.

## PERSONAL OF H-O-B MANUFACTURING CO.

The H-O-B Manufacturing Co., Indianapolis, Ind., announces that it has purchased the business of the Hiatt Manifold Co., the former manufacturer of the Ideal Vaporator, and will continue to make this product under the oversight of the following officials:

President, W. F. Hiatt; secretary and treasurer, D. G. Ong, sales manager and director of advertising, E. D. Fouts.



## Automotive Activities in the Foreign Field

### Big Export Market for Automobiles

S. A. Miles, the automobile show manager for the National Automobile Chamber of Commerce, who recently returned from a three months' tour in Great Britain, France and other parts of Europe, states that there is a fine potential market for American cars and trucks in Europe, but more especially for those manufacturers who are already established there and whose cars are well known to the public. "Great care will be necessary in the next two or three years in handling cars on the other side," said Mr. Miles, "because of uncertain business conditions, which are, however, very much better than we have any idea of here."

"The English and French are keen for American cars, are buying them now at abnormally high prices and probably will continue so to do. The establishment of new agencies and the upbuilding of new business during the next two or three years will be attended by some risks and should be undertaken only by concerns of unquestioned financial standing. It is costly to do business there now and no maker can hope to make much headway unless his representatives carry an ample line of spare parts and can render proper service."

"As a result of the war, all Europe, and, in fact, all the world, has been completely sold on motor transportation, both for persons as well as merchandise. The truck business continues to grow, especially as the railroads over there are overtaxed."

"The small type of car seems to be the favored. Of these great numbers are seen on the road, but of the big cars not nearly so large a portion as we see at home. Dealers with whom I talked declare that people are not anxious to buy expensive cars and moreover the cost of operation has its effect. Gasoline, which, by the way, is a very much better grade than we have here, is selling at about 74 cents an English gallon, which is high compared with our price here, the result of high taxes and the fact that all the gasoline has to be imported."

"I think the English as well as the French are pretty well satisfied that they get high value for their money in the purchase of an American car."

"The European makers naturally are putting forth every effort to offset our trade in cars and trucks in other countries. The rivalry is keen but friendly, European manufacturers not overlooking the fact that America has a great advantage in the price at which it can sell its cars throughout the world, owing to our big home market that permits quantity production."

A short street car ride in Vienna, which before the war cost three cents, now costs half a dollar. A motor omnibus fare is \$2.

### MANY MOTOR CARS OWNED IN SWITZERLAND.

It is estimated that there are now owned in Switzerland between 10,000 and 12,000 automobiles, 1500 to 2000 motor trucks and 5000 to 6000 motorcycles. According to statistics the number in 1917 was 9425, 5076 automobiles, 1216 trucks and 3133 motorcycles. Seven of the trucks and 305 of the passenger cars were of American make. The other principal makes are Picpic and Martini of Swiss manufacture; Fiat, Bianchi and Scat, Italians; Benz and Mercedes, German, and Clement-Bayard, Reynaud Panhard and Levassor, French.

The prices of European cars in this market range from \$2316 to \$5211. The 1919 Martini seven-passenger touring car is priced at \$5211, but is not equipped with self-starter, lamps and other electric equipment furnished with a first-class American car.

### MOTOR TAXES BASED ON VALUE OF CAR.

A new scale of motor taxation comes into force in Holland this year under which the value of the car is made the basis. Cars valued less than 2000 francs are taxed two francs (38.6 cts.) for every 100 francs value; for cars valued between 2000 and 4000 francs are taxed a fixed amount of 100 francs for each 100 francs exceeding 2000 francs; 4000 to 7000 francs, a fixed sum of 85 francs, plus 2.50 francs for every 100 francs exceeding 4000; 7000 to 10,000 francs, 160 francs, plus 2.75 francs for each 100 francs exceeding 7000 francs; over 10,000 francs, 2425 francs, plus three francs for each 100 francs exceeding 10,000 francs.

### MOTOR OMNIBUS SERVICE IN ITALY.

Owing to the fact that Italy to a considerable extent is a mountainous country, railway lines can only be built at much cost and labor. About 10 years ago public automobile services as feeders to the railways were inaugurated at certain points and proved so successful that today it is believed that Italy ranks first in the use of this auxiliary traffic medium. The total length of roads over which motor lines are run on fixed time tables is 8700 miles, there being 400 regular lines.

The Fiat Corporation of Turin took the initiative in inaugurating this service and, at the present time, 350 of the 400 motor lines operate Fiat cars exclusively.

### HARTFORD CO. BUYS ACME STOCK.

Announcement is made that the Hartford Automotive Parts Co., Hartford, Conn., has purchased the entire issue of the stock of the Acme Universal Joint Manufacturing Co., Kalamazoo, Mich., and will take over the management and inaugurate a policy of expansion.

### Trade Opportunities Abroad

(Information in regard to names and addresses may be obtained from the United States Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., or its district and cooperative offices, upon written request, mentioning the opportunity number.)

33,334—Dealers in machinery in Italy desire to secure an agency for the sale of lubricating oils of all kinds. Correspondence may be in English, but Italian is preferred. References.

33,358—A merchant firm in Spain desires to purchase and secure agencies for chemical products, cotton, automobile accessories and steel. Quotations should be given c. i. f. Spanish port. Correspondence may be in English. References.

33,359—A commercial agent in Switzerland desires to purchase and secure an agency for the sale of light automobiles (touring cars) from firms that are able to deliver quickly and give a guaranty for manufacture. Quotations should be given c. i. f. Antwerp. Payment to be in cash or bankers' guaranty. Correspondence should be in German or French. References.

33,361—Automobile importers in the Dutch East Indies desire to secure an agency for the sale of a high grade motor car and also a low priced motor car. References.

33,368—A manufacturers' representative in South Africa desires to secure an agency for the sale of light automobiles. References.

33,404—A commercial agent in Italy desires to secure the representation of manufacturers of automobiles and agricultural machinery and accessories. Correspondence may be in English. Reference.

33,421—A firm of mechanical and electrical engineers in India desires to receive quotations from manufacturers on a large number of motors and generating sets, specifications of which were forwarded. Prices to include effective packing for shipment and delivery f. o. b. American port. A list of firms represented by this company was forwarded.

33,423—A commercial agent in Cuba desires to represent manufacturers on a commission basis for the sale of paints, varnishes, lubricating oils, greases, imitation leather, hosiery, shoes, automobiles and trucks, tires, adding and calculating machines and disinfectants.

33,429—The partner of a firm in Chile is in the United States and wishes to purchase a complete line of hardware, including automobile accessories, cutlery, silverware, and also to secure an agency for a medium priced automobile.

33,430—An importing company in Denmark desires to purchase and secure an agency for the sale of japanned leather, colored hides for upholstery of motor cars and carriages. Reference.

33,434—A commercial agent in Spain desires to secure agencies for the sale of high class automobiles, carpenters' and locksmiths' tools, flour and olive oil mill machinery, lubricating oils, cotton and woolen piece goods, crockery and glass ware, enameled kitchen ware and all kinds of machinery used in connection with the sugar refining industry. Quotations should be given c. i. f. Spanish ports. Correspondence may be in English. References.

33,447—A commercial agency firm in Honduras desires to secure the representation of manufacturers and exporters for the sale of medium and high priced automobiles and motor trucks, one-half ton and up, suitable for hilly country. Quotations should be given f. o. b. American ports or c. i. f. Amapala. References.

## FORD STARTING AND LIGHTING SYSTEM

The Automobile Journal begins, in this issue, the first and most comprehensive article on the Starting and Lighting System of the Ford Motor Car that has ever appeared in any publication. It will be found to be a complete and practical discussion of the various components of this system, comprising a description of their construction and functions and directions for their testing, care, adjustment and repair, treated in such a manner as to be easily understood and readily followed by any Ford owner.

It will be continued in succeeding issues of the Automobile Journal, and each installment should be retained, as it will form a complete, popular treatise on the Ford Starting and Lighting System.

THE "F. A." Liberty Ford starting and lighting system was first used in 1919, during the latter part of the season in the sedan and coupe. Beginning with 1920 the Ford Motor Co. made plans to fit all Ford cars with this system, its use being continued on the sedan and coupe, while it was made optional on the roadster and touring car. The engines were equipped with the necessary brackets and fittings, which allowed the generator and starting motor to be used, if the owner desired, an additional charge of \$75 being made if the car owner cared to have the system installed.

the two-unit, six-volt type, using the one-wire grounded system of wiring. The generator is located on the right hand side of the engine, is operated by a small helical gear meshing with the large timing gear in the timing gear case. The starting motor, which is located on the left hand side of the engine and fastened to the transmission cover, operates through a Bendix drive, the gear of which meshes with a large ring gear on the flywheel, the ratio of these gears being 12 to one.

The storage battery is hung in the frame on a special bracket and is located toward the rear of

the chassis on the left side. The battery is of the three-cell, six-volt, 80-ampere hour type. Both Prest-O-Lite and Exide batteries are standard equipment. The starting switch is attached to the left-hand side of the frame, the plunger extending through the permanent flooring of the car.

The ammeter is combined with the ignition and lighting switch in a single panel which is located in the instrument board convenient to the driver. The latter switch is of the combination type.

the lights being controlled by a three-position lever, while the ignition is operated by a key inserted through the center of this lever. The wiring throughout is No. 16 Brown & Sharpe, with the exception of the cables on the starting motor circuit, which are No. 0 Brown & Sharpe. The small wires are covered with different colored insulation to facilitate tracing the different circuits. Figure 1 shows the standard wiring diagram.

Because of the difficulty in obtaining lamps it was found necessary by the Ford Motor Co. to equip the cars with three different lighting systems, that is, the two-bulb system, the double-

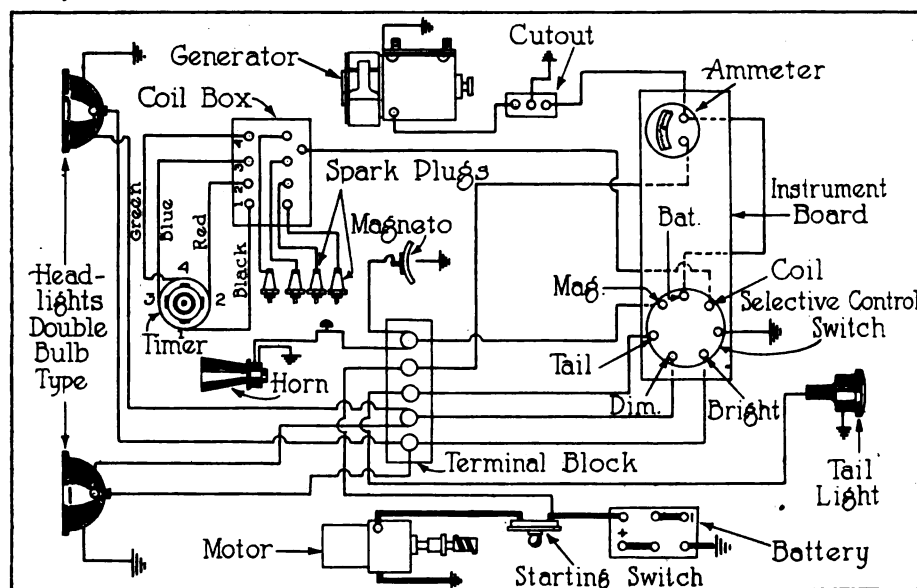


Figure 1. Wiring Diagram of F. A. Liberty Starting and Lighting System as Used in 1919 and 1920 Ford Cars.

Many of the cars equipped with the system have been in use for some time, its practicability being proven, but as defects are liable to show in the units sooner or later, it is well for the owner and repairer to know the methods to be used in locating the defects, and what instruments and testing devices are necessary.

This article is designed to explain, in detail, the proper procedure for disassembling and assembling the units, how to test, then what to look for and the correct method of making and using the testing instruments.

### Ford Starting and Lighting System.

The Ford starting and lighting system is of

## CONSTRUCTION OF THE GENERATOR.

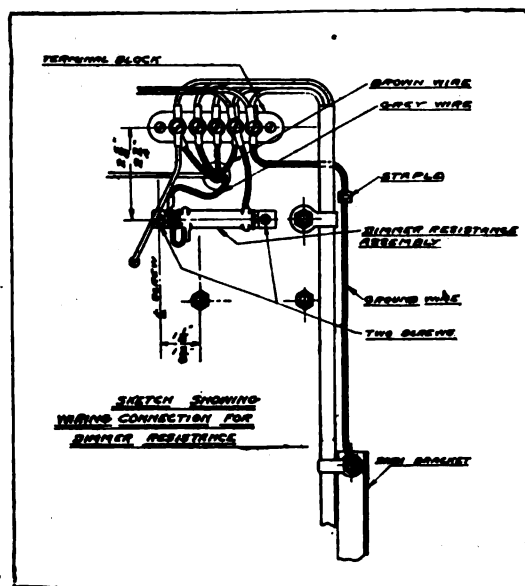


Figure 2, Indicates Necessary Changes in the Wiring System When the Resistance Coil Is Used.

filament bulb system and the single-filament bulb combined with a resistance coil. The only difference between the first two systems is the connection at the lamps. Figure 2 shows the necessary change in the wiring where the resistance coil is used. The magneto is not used as a source

of current in lighting the cars equipped with a starting and lighting system. The bulbs used are six-eight-volt, 16 candlepower for headlights and two candlepower for rear light and dimmers.

## Construction of Generator.

The generator, shown at Figure 3, is of the series-wound armature, shunt-field type, the current being controlled by a third or "nigger" brush. The brush is attached to the gear case by means of three cap screws. To prevent the oil from leaking out at the connection between the front bracket and the gear case, a paper gasket is inserted between them. The gear on the generator armature shaft meshes with the large timer gear. The relation between these gears is such as to give the armature a speed  $1\frac{1}{2}$  times that of the engine. When the car is in high gear every 200 revolutions a minute of the engine represents a driving speed of five miles an hour. Therefore, at the average driving speed of 20 miles an hour the generator would be turning at about 1200 revolutions a minute.

The current which excites the field is drawn from the third brush. The position of this brush in relation to the ground brush determines the amount of field distortion. By moving it backward or forward, in the direction of the rotation of the armature, the proper charging rate may be

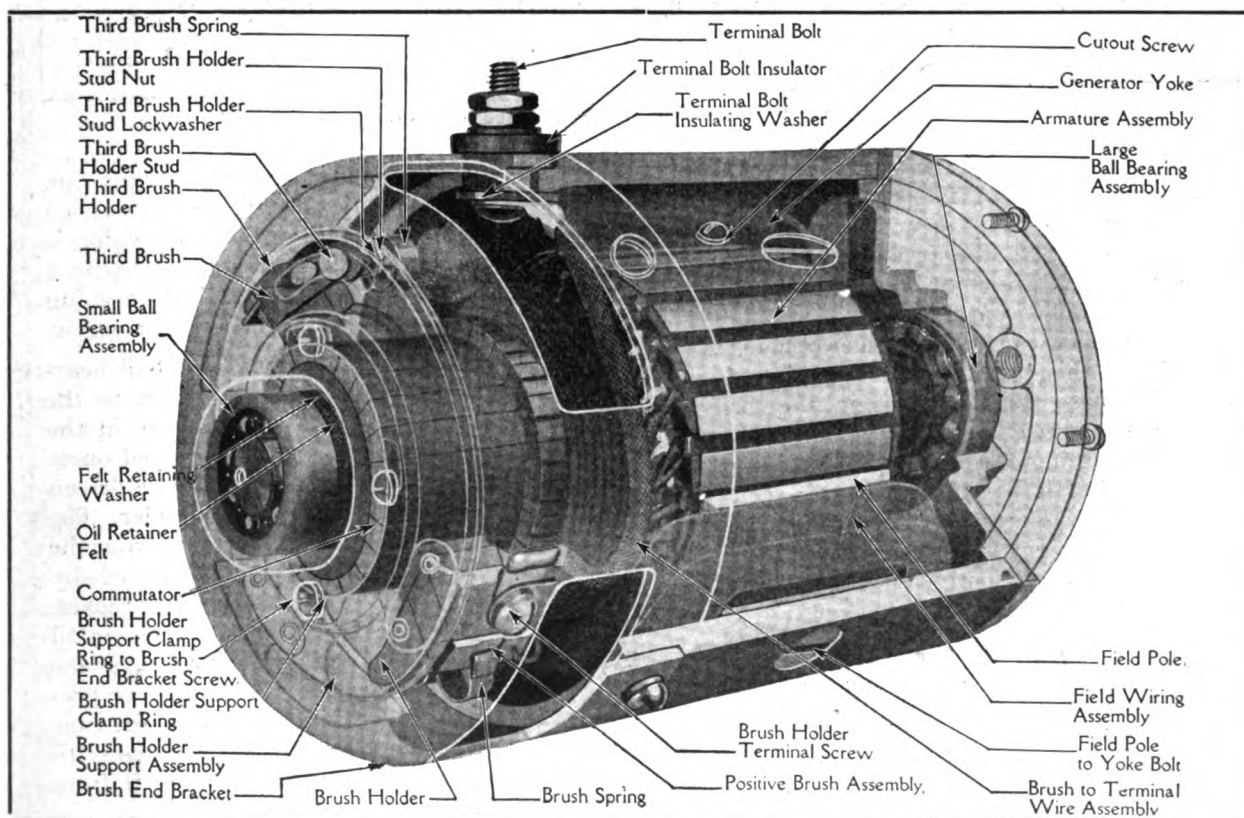


Figure 3, Phantom View of Generator.



### DISASSEMBLY OF THE GENERATOR.

obtained. The brush should be set with the generator running at 1500 revolutions a minute, as this point is the "knee" or high point of the current curve and there is no likelihood of getting too high a charging rate when the brush has been set at this speed.

Figure 4 shows the parts of the generator in their relative positions for assembly. The yoke is made of seamless steel tubing. The field coil are assembled around the pole pieces, which are secured to the yoke by means of screws. When the pole pieces have been properly tightened in place, small punch marks are made in the yoke forcing some of the metal into the slots of the screws, thus preventing them from turning. Fish paper is assembled between the coils and the yoke at the head end to provide insulation for the exposed ends of the coils. The terminal post extends through a slot in the head end to the yoke and is insulated from it by means of a specially designed insulator and fiber washer.

One end of the field coil is attached to the

grounding. The third or "nigger" brush, which furnishes the current for the field excitation, is assembled to the holder but insulated from it by two fiber strips. A radial slot in the strips allows the holder to be advanced or retarded so that the brush may be brought to bear at the proper point on the circumference of the commutator. The third brush is held in position on the support by means of a lug and threaded holder stud which passes through the slot and the insulator. A clamp nut and lock washer on this stud secure the holder to the ring. When the brush has been properly set the nut is tightened, thus holding the brush in position.

The brushes are of the carbon type, which require no lubrication. Never apply oil to the commutator. The brushes are held against the commutator by means of the coil spring, which fits into a slot in the post of the holder. On the third brush the holder stud is slotted to take the spring. When the spring has been properly positioned in the slot the end of the post is pinched together at

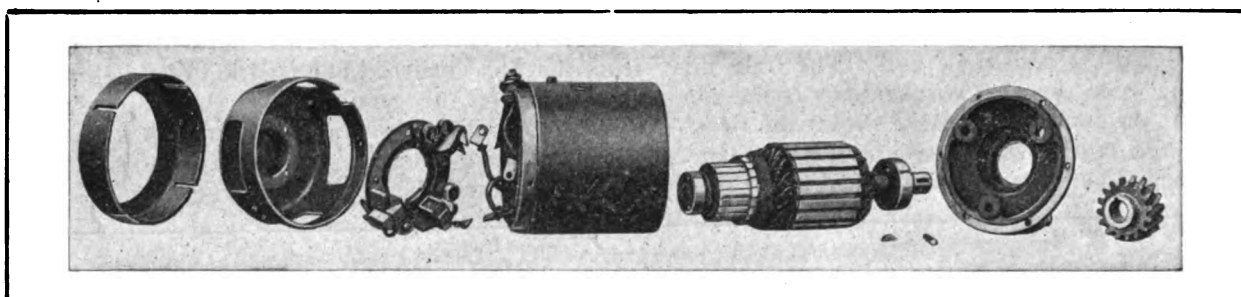


Figure 4, Generator Disassembled Showing Order of Assembly.

third brush, while the other is grounded through the ground brush holder. The brush and bracket is attached to the yoke by means of four screws. This bracket supports the brush ring and one bearing of the armature shaft, and acts as part of the housing of the generator, which is completely enclosed when operating. The brush holder support is held to this bracket by means of four screws which pass through slots in the brush support. These screws tighten into a clamping ring, thus preventing the brush holder support from turning after it has been properly secured. The four slots in the mortise of the brush holder support allow sufficient movement of the brushes so that they may be properly positioned with relation to the armature and field.

The ground or negative (—) brush holder is riveted directly to the support, while the positive (+) brush is riveted to a plate, two fiber pieces insulating it from the support. The support is so shaped that the ends of these rivets do not touch the bracket, thereby eliminating all possibility of

the sides, thus preventing it from coming out. The current collected by the brushes is carried away by a wire, or pig tail, one end of which is secured in the brush, either with solder or with a screw, while the other end is attached to a lug which is clamped to holder by means of a screw.

The armature is supported by two ball bearings. These assemblies are pressed on to the shaft of the armature and are slip fits in the brackets. The commutator is also pressed on to the shaft, and the wires from the coils are driven into slots on the segments and set in solder. The front bearing is lubricated by the vapors from the gear case, while the rear bearing is served by means of a small oiler in the brush and bracket. There is a specially designed steel washer or oil ring, working on the centrifugal principle, on the gear end of the front bearing. This washer prevents an excess of oil working from the gear case into the generator. The rear bearing is fitted with a felt and steel washer to prevent the oil from working through to the commutator.

### TESTS FOR GENERATOR FAILURE.

The front bracket, which is attached to the yoke by six screws, acts as a support for the front bearing of the armature shaft and as a part of the

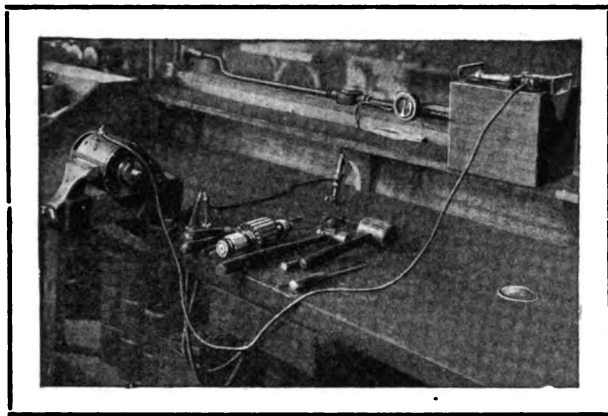


Figure 5. Arrangement of Test Bench When Testing Generator or Motor.

housing of the generator. It is also the portion of the assembly which is attached to the gear case. The driven gear is secured to the shaft by means of a Woodruff key and a pin which extends through the gear end of the shaft.

#### Locating Generator Troubles.

Generator troubles are first indicated by the action of the ammeter on the instrument board. At a normal driving speed of 20 miles an hour, and with all lights off, the instrument should register 8-12 amperes charge. If there is less charge than this, or no charge at all, the trouble lies in the generator cut-out or in the wiring. If there is a volt-meter available, the repairer may determine immediately whether or not the trouble is in the generator by attaching the positive wire of the meter to the terminal of the generator and the negative wire to the yoke.

With the engine running at normal speed (20 miles an hour) the instrument should read seven volts or better. The meter used should be a direct current volt-meter reading from 0 to 30 volts. However, if no volt-meter is available the repairer may determine the trouble as being in the generator by the process of elimination. Examine the wiring—trouble in the wiring may be due to one of the following causes, which may be found by inspection:

1. Poor or loose connection in the wiring between the generator and the battery.
2. Dirt or fiber in the terminal lugs of the wire.
3. Broken wire.
4. Ground.

Any trouble in the cut-out is found by trying a new one in its place. Since this instrument

must be set to cut in at a certain voltage, any adjustment on it should be made by the manufacturer, where the necessary equipment is available. It sometimes happens that the cut-out will stick. It may often be opened by running the engine until a charge is registered on the ammeter, after which the ammeter should read 0 provided the lights are not turned on and there is no ground or short circuit in the wiring system. If this does not correct the trouble the cut-out should be replaced by a new one immediately.

#### Testing and Repairing the Generator.

If the generator registers less than seven volts or the repairer has determined by the process of elimination that the generator is causing the trouble, it should be removed from the engine and taken to a repair bench, where it may be tested and repaired. To remove the generator, disconnect the wire leading to the dash, and run out the three cap screws which hold the bracket to the case. This will free the generator and it may then be removed by prying it off with a screw driver, forcing it off and down until the screws disengage.

Troubles in the generator may be due to one of the following causes:

1. Dirty commutator.
2. Brush springs weak or binding.
3. Brushes not set properly.
4. Brushes not touching commutator—(a) held up by spring; (b) sticking in holder; (c) worn too short.
5. A short circuit in the armature, or field.
6. A ground in brush wires, field or armature.
7. An open circuit in field, armature or brush wiring.

Besides the electrical troubles, the generator is subjected to mechanical wear as follows:

1. Commutator: (a) rough; (b) undersized (brushes rubbing on mica insulation in slots between copper segments).
2. Bearings broken or worn.
3. Brush support shifting.
4. Third brush holder shifting.

(To Be Continued in October.)

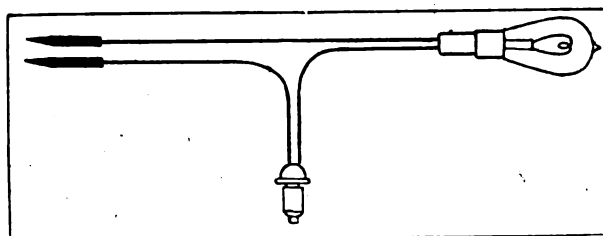


Figure 6. Test Lamp Provided with Points and Plug for Fitting Lamp Socket.

# HUMOROUS SIDE OF MOTORING

## ALL THE MODERN CONVENIENCES.

"Crankleight got a new touring car recently," said the first man. "Had it made after his own ideas. It was equipped with a collapsible table and chairs, and a small cooking range, and a pantry stocked with things to eat, and a little shelf of books, and a collapsible piano, and a folding bed, and—"

"Good gracious!" interrupted the other man, "I'll bet he simply lives in it."

"Not much. He hadn't done more than get it when his wife took a notion it was time to do spring cleaning in it!"  
—Boston Globe.

## CAR WORTH HAVING.

Hen Peckem—How do you like your new automobile, Harker?

Harker—Not much. Why, it makes so much noise when I take my wife out on a spin I can't hear a word she says for miles and miles.

Hen Peckem (quickly)—Great Caesar! How much do you want for the machine?

## SPIRIT OF THE AGE.

Willie—Paw, what is the moving spirit of the age?

Paw—Gasoline, my son.—Cincinnati Enquirer.

## OLD PROVERB REFUTED.

"Who are you?" asked the Wayfarer as he saw something on the pavement that looked injured and huddled up.

"Me? Why, I'm Truth."

"Well, then," said the Wayfarer, "if you're Truth why don't you get up? I have always heard that 'Truth, crushed to earth, will rise again.'"

"Yes," came the feeble answer, "but it's different in this age. You see I was hit by a truck."



## BOSS OF THE ROAD.

The limousine's queen of the boulevard;  
The roadster's a flighty chap;  
The touring car is a family man,  
Though he rambles all over the map.  
I'm only a snub-nosed motor truck,  
A four-wheeled working guy—  
But I'm boss of the road when I'm hauling a load,  
And humping along on high.

Honk! honk! Step on there, bo!  
Feed me a little more gas!  
This lot of freight is keeping a date,  
And another guy's trying to pass.

When my fore wheel's up to the hub in mud,  
My rear's in a gravel pit,  
And the road ahead is a greasy swamp  
With a ditch on each side of it—  
What's the odds to me, while the gas holds out,  
And my big four wheels can bite?  
For I'm boss of the road when I'm hauling a load,  
And the engine's hitting right.

Honk! honk! Step on there, bo!  
I'm needing a little more zip.  
No skiddy muck stops a motor truck—  
Told you I'd make it that trip!

When the blizzard howls in the city streets,  
The pleasure cars lie abed;  
But I'm bucking my way through the climbing drifts,  
That the folks may be warmed and fed.  
Then it's—"Take the short cut! Use the boulevard!"  
We're wanting that stuff P. D. Q!  
For I'm boss of the road when I'm hauling a load,  
And only a truck can get through.

Honk! honk! Step on there, bo!  
Here comes another tough bit!  
Feed me the gas and I'll show my class—  
A motor truck never cries "Quit!"  
—C. R. Barrett in "100%."

## HE WANTED A PROXY.

"William," said the clergyman to his new chauffeur, "do you—er—ever employ



strong language?" The new man looked a trifle uneasy. "Well, sir," he faltered, "I know most all the words and some times when I'm careless they do seem to get away from me before I can stop 'em." "Ah," observed his employer, "I'm sorry, William—I'm sorry! But we will consider that at some more fitting time and place. Just now I want you to go to Stickem and Cheete and settle this bill for overhauling my car for the third time this season. And you might talk to them William, as if it was your own bill, in a careless-like sort of way. Will you do this, William?"

## EVEN THE CATS ARE "A LA MODE."

A Ware man who drove to church in his automobile was surprised after the service was over to find the family cat with five new kittens in the rear part of the machine. The cat seems to think that the automobile is their proper home, for when they are taken out, as soon as she can she lugs them back again.

## STILL FOND OF THE RATTLE.

Redd—So you've had the baby out in your fivver, I see.

Greene—Oh, yes, take him out every day in it.

"Does he like it?"

"He's tickled to death! You know he was brought up on a rattle."

## NOT SO VERY FUNNY.

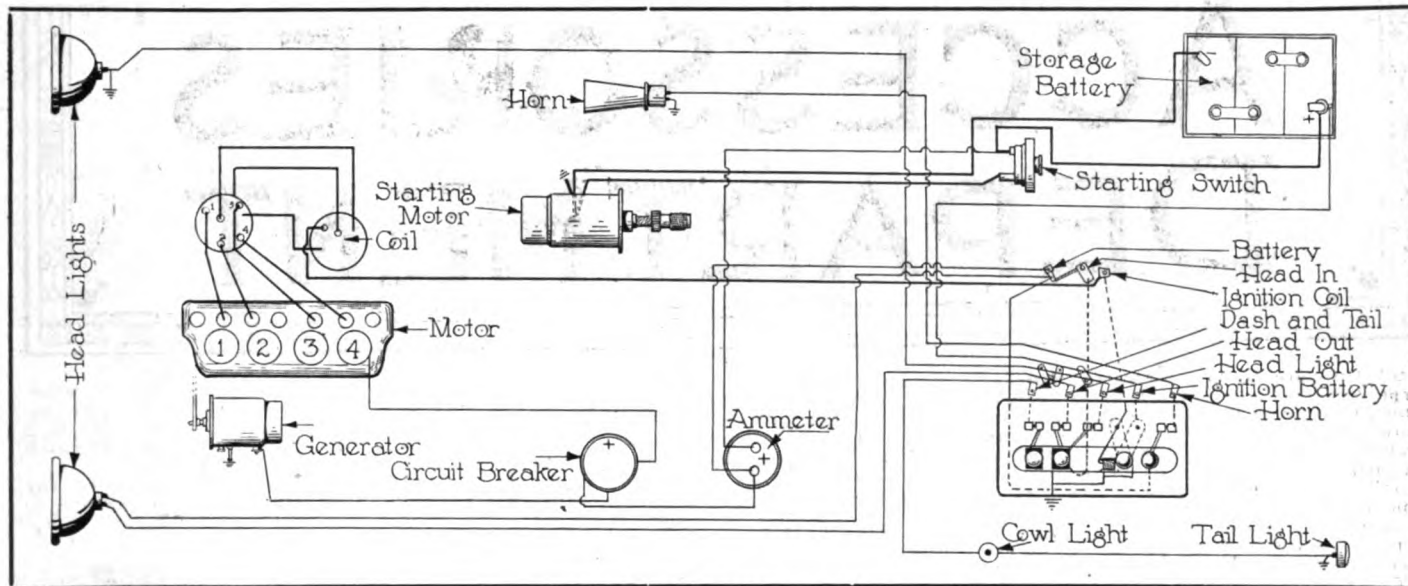
"It's funny how afraid your horses still are of automobiles up here," said a summer visitor to a Maine farmer.

"I don't know that it is so funny," answered the farmer. "Not so strange, when you think how an automobile must look to a horse. Wouldn't it seem strange to you if you saw my pants comin' down the road with nothin' in 'em?"

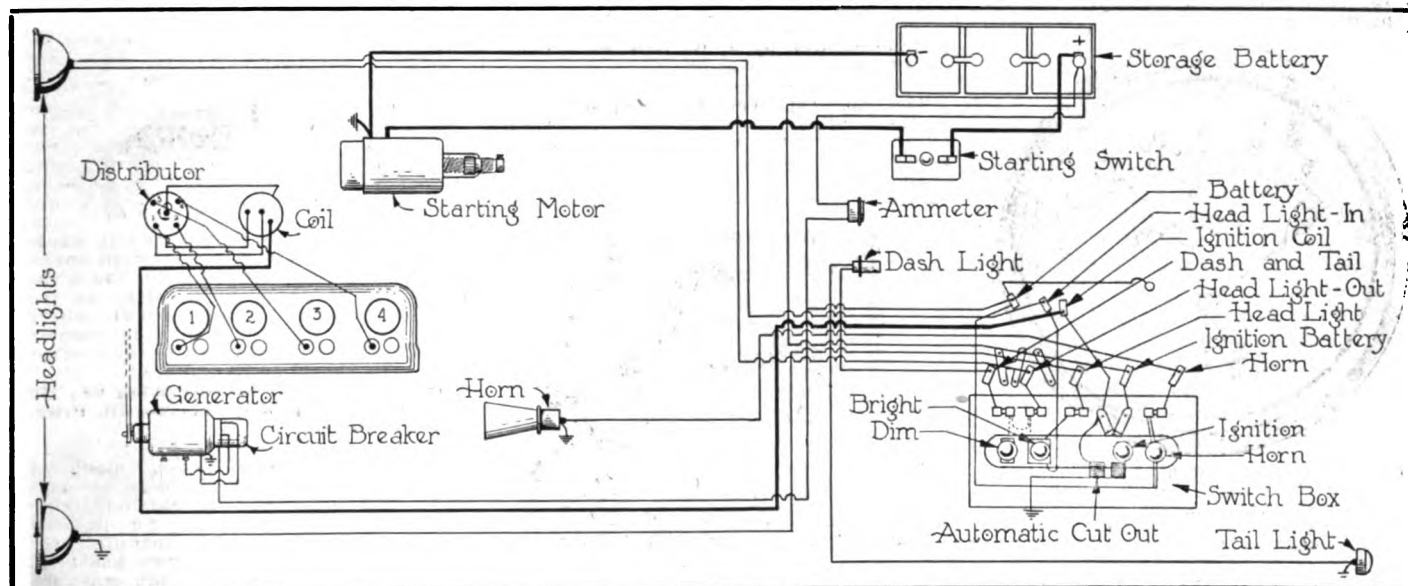




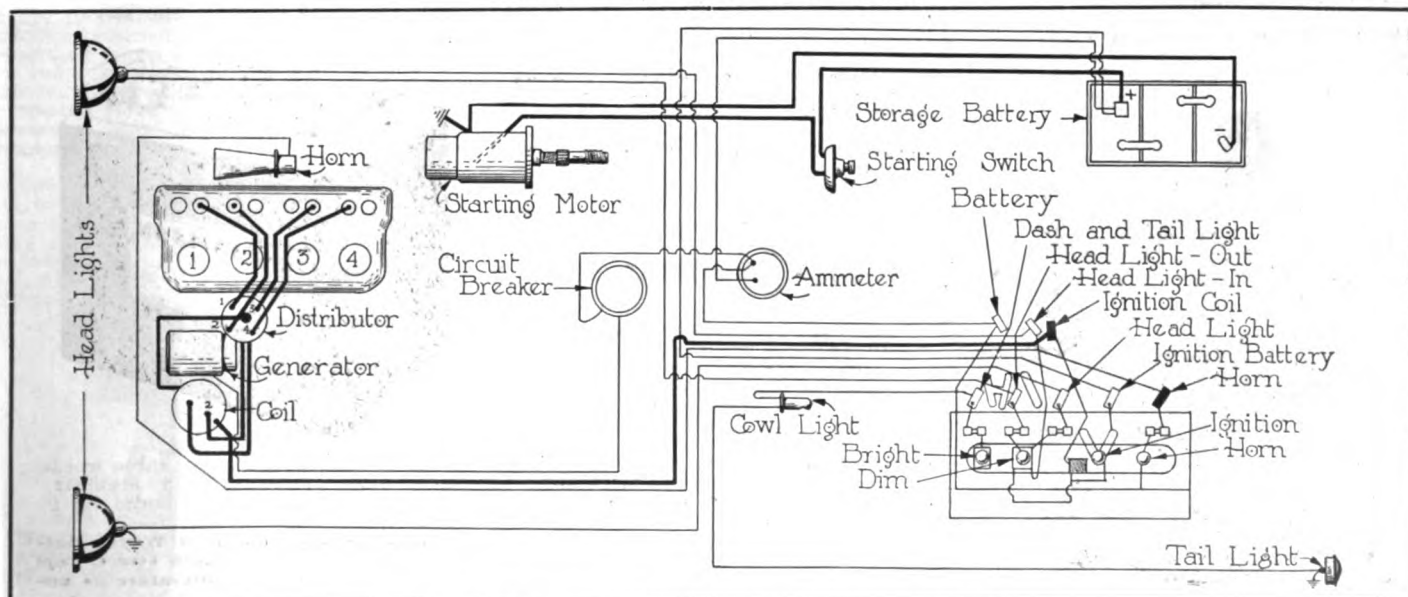
# Monthly Wiring Diagram No. 7



Overland Model 75-B, 1917, Four Cylinders.



Overland Model 85, 1917, Four Cylinders.



Overland Country Club Model, 1918-1919, Four Cylinders.

# ACCESSORIES DEPARTMENT

**Oil Pressure Gauge Standard Bracket Type No. 185 A** is an all-metal gauge, which is fitted to the cowl of the dash and shows the pressure of the oil in the oiling system at all times. The finish of the instrument matches that of the electrical instruments usually found on the dash. Pounds pressure are indicated from zero to 30 pounds, while a special stop feature is provided which prevents damage due to excessive pressure.

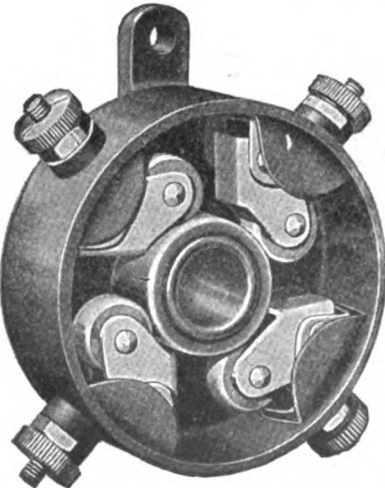
The company manufacturing this instrument also makes a complete line of oil and heat registering gauges of all descriptions for the automobile, air plane



and motor boat, including welding apparatus, etc. The line is shown in a new catalogue just issued, which gives a complete description of each instrument and the specifications. This catalogue will be sent to the trade on request.

Manufactured by the National Gauge and Equipment Co., La Crosse, Wis. Prices and literature on request.

The 1921 Duntley Four-Unit Timer for Ford Cars, Trucks and Fordson Tractors has been especially designed to meet the high speed of the Ford and Fordson en-



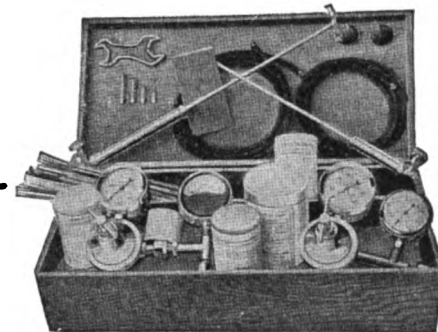
gine in truck and tractor use. It is adapted to fulfill the requirements of the Fordson tractor and the Ford truck which, it is stated, are geared 18 to one and 12 to one respectively, as actual tests have demonstrated, while its use on the Ford passenger car is assured, as it is geared 3.7 to one.

It is claimed that timer misfires are practically impossible with this new timer, as absolute assurance is given of equal spark duration in all four cylinders, thus guaranteeing perfect combustion. Guaranteed for one year regardless of mileage or service.

Manufactured by J. W. Duntley, Chicago, Ill. Price on request.

The Admiral Welding Equipment includes a full outfit for all classes of work requiring welding, except the oxygen and acetylene gas tanks.

The Admiral equipment has, it is stated, passed the experimental state, as it has



been in use for a number of years.

If tanks are desired they can be purchased when ordering the equipment; otherwise, the kind of oxygen and acetylene gas to be used should be stated so that proper connections can be furnished with the equipment.

Manufactured by the Admiral Welding Machine Co., Kansas City, Mo. Price of equipment, \$75.

**Lowmabery Extension Handle** consists of a drop forged hook on an extension handle for use with single and double-head flat and S wrenches. It is designed to give increased leverage and power



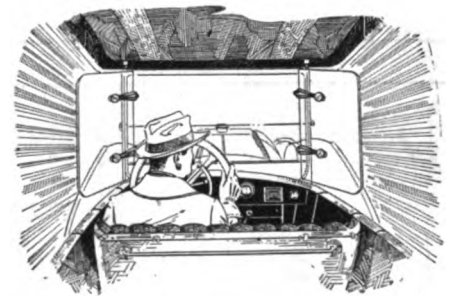
without undue strain on the wrench and bolt heads, has a hardened screw driver end and is a very handy and efficient tool for both the automobile tool kit and the garage.

Manufactured by the Gardener Specialty Co., Scranton, Pa. The price with unfinished handle is 75 cents and with nickel plated handle 90 cents.

Star Wings are simple in construction and easily attached to any car. It is claimed for them that they stop draughts

on the back of the neck, deflect the wind and dust in summer and obviate the necessity for curtains in winter; that they not only add comfort, but instantly catch the admiring eye of the public.

They can be instantly shifted to any angle by simply pushing them around to



the desired position. If more air is wanted they may be turned to a forward angle.

Star Wings have no holes in the glass to weaken it and cannot rattle, as the glass is thoroughly protected with rubber bushings. The glass comes in regular lengths, 18 and 20 inches, and other lengths are supplied as required.

Manufactured by the Star Wing Co., 170 West Randolph Street, Chicago, Ill. Price, \$22.50 per pair.

**Samson Storage Batteries** are manufactured for replacement purposes on passenger cars and trucks for starting, lighting and ignition and also for isolated farm lighting plants. The manufacturer states that the Samson battery has been brought up to its present high standard after long and exhaustive tests; and that it is notable for its wonderful power delivery and quick action. The slogan of



the manufacturer consists of three words, "Standardized, Strength and Stability," which is stated to be amply borne out by the battery in use.

Manufactured by the Fort Wayne Battery Co., 230-300 East Fourth Street, Fort Wayne, Ind. Prices and literature on application.

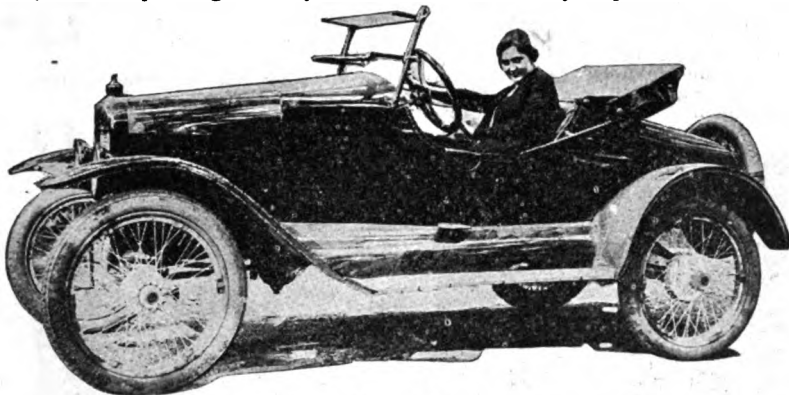
(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Lamco Line of High Grade Bodies for Ford Cars comprises four styles: Sporting model F 50, racing model "23," touring model F 99, and the Lamco De Luxe model five-passenger body. The

covered running boards, side shields, radiator shell and hood, large gas tank and spare tire carrier.

All wood work is finished in walnut, while the body is painted Stutz blue, red,

The Jamcap Rim Tool has recently been developed for removing or replacing tires on demountable rims of passenger cars, and is claimed to be the best of all rim tools. The device consists of two clamps which are firmly fastened to the rim, one at either side of the brake; the ends of



Lamco sport model roadster is of the semi-racing type, having straight, low-out lines, slanting windshield, one-man top and French plaited upholstery. The outfit comes complete with high grade top and windshield, crown fenders, linoleum

Mercer yellow, or Brewster green. The fender and hood are finished in black only.

Manufactured by the Lehman Manufacturing Co., Cannelton, Ind. Prices and literature on request.

The H. & D. Patented Shock Absorbers for Ford Cars consist of a special alloy, drop forged steel perch, equipped with high carbon steel bolts fitted with castellated nuts and cotter pins, and a high grade malleable iron arm to which are attached two large coiled springs made of Premier steel wire, .50-.65 carbon, heat treated after rolling and securely attached to the arm. Rear hooks and front clips are provided for attaching the springs to the car and it is stated that the absorbers are easily fitted and that it is unnecessary to bore new holes when attaching. It is claimed that the riding qualities of the car are greatly improved after the absorbers are installed, and that the operator need not fear travelling over rough roads. The absorbers are sold on

Endura Sheet Packing is made of vegetable fiber, chemically treated, and is stated to be unlike any other packing on the market. Though black in appearance, it contains neither rubber nor asbestos. Endura sheet packing is claimed to be as tough as rawhide and extremely light, is easily cut to make perfect joints and gives unusual service in thin sheets.

Where it is desired to use a packing that is liable to come in contact with



water, gasoline, oil, etc., Endura packing is guaranteed to fill the bill, with the exception of parts subjected to intense heat and, for this purpose, a copper asbestos gasket is recommended.

Manufactured by the Endura Manufacturing Co., Philadelphia, Pa. Prices on request.

Molded Radiator Caps are made of a cold molded composition having an asbestos base with a cement binder. The manufacturer states that this composition is molded under 30 to 50 tons hydraulic pressure on to brass, male and female

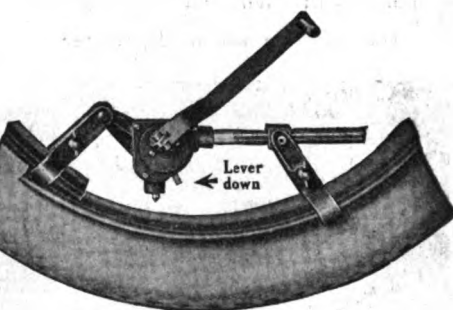


threaded inserts. The caps are guaranteed not to be affected by any temperature fluctuations which will be experienced in



service or, as a matter of fact, by any temperature, from zero to 600 degrees Fahrenheit, nor by alcohol or the fumes from any other non-freezing mixture.

Manufactured by the American Insulating Co., New Freedom, Pa. Prices on application.



the clamps are joined by the operating mechanism and a threaded worm. To operate the tool after it has been fitted to the rim, the handle is turned to the right, which action causes a small threaded pin to turn downward on the underside, coming in contact with the rim, and raising one end of it at the break. Still further turning of the handle to the right causes the connecting worm to turn, contracting the ends of the rim and passing the free end over the fixed end, allowing the tire to be slipped off the rim. To replace a tire the operation is reversed.

It is stated that pinching of the fingers or of the inner tube is reduced to a minimum, and that no other tools are required to remove a tire no matter how badly it may be rusted to the rim.

Manufactured by Jamcap Rim Tool Co., Caplan Brothers, sole agents, 77 Bedford Street, Boston, Mass. Price, \$7.50 list.

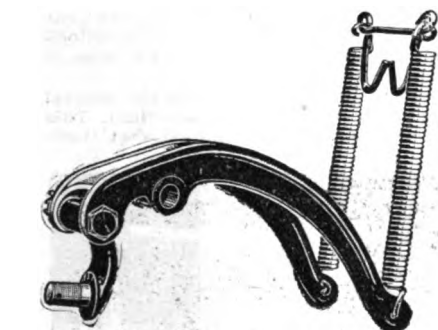
Stone Shock Absorbers for Dodge Cars and others using a three-quarter or scroll end, elliptic type spring, is designed to add to the easy riding qualities of the car and prevent road shocks from reaching the occupants of the car. It is stated that Stone shock absorbers relieve the severe back-throw or rebound of stiff springs, in this manner saving the life of the spring.

The shock absorber is made in a cylindrical shape and is fitted at the end of three-quarter elliptic springs. It is composed of two springs, one inside of the other, which fit against an adjustment block at the top and the cylinder at the bottom. Adjustment is made by turning



the long bolt which passes through the center of the springs and draws down the adjustment block, supplying more tension to the spring. Compression grease cups are fitted to the suspension bolts which pass through the spring ends, supplying sufficient lubrication to the bushings within the spring ends. Felt retainers are also supplied, which hold the oil precisely on the bearings which are to be lubricated. Stone shock absorbers are fully guaranteed against defects in material or workmanship for a period of one year from date of purchase.

Manufactured by the Stone Manufacturing Co., 1502 South Michigan Avenue, Chicago, Ill. Price, f. o. b. Chicago, \$10 per pair for rear springs, war tax paid.



a 30-day trial and, if not as represented, may be returned to the dealer, the dealer receiving a new set from the manufacturer and compensation for his labor in removing them.

Manufactured by the H. & D. Co., Crawfordsville, Ind. Prices and literature on request.

The "All In One" Valve Tool is in reality five tools in one and is claimed to possess all the advantages of other tools of this type, besides being made from flat cold rolled steel, case hardened, and can be conveniently carried in the vest pocket.



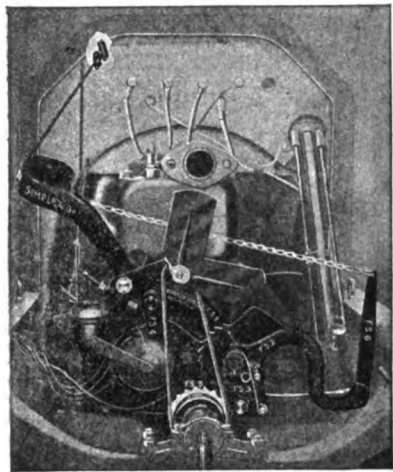
It is claimed that this little tool will do the work that higher priced tools are designed to do and retails for much less.

Manufactured by the E. G. Manufacturing Co., 250 West 54th Street, New York City. Price, 25 cents each.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The Simplex Starter for Fords** is a newly designed starting device for the Ford engine, and may be attached to any Ford engine in a few minutes' time, as there are but two bolts used. The device is shipped, assembled, with the necessary bolts and fittings, and, it is stated, anyone handy with tools can properly install it.

The castings from which the starter is



made are malleable iron, which has been given a test for strength at the factory of 50,000 pounds to the square inch, much more than it probably will ever be called upon to stand in actual work.

A ratchet gear is fastened to the crankshaft, which meshes with the half gear on the starter arm when the starter is being used. As soon as the engine starts this gear is released, allowing the crankshaft to turn free. A safety device is also included in the outfit, which prevents the engine from backfiring when it is being started.

Manufactured by the American Starter Co., Anderson, Ind. Price, \$15.

**Steam Bag for Tire Vulcanizers** is a rubber bag fitted with steam connections which is placed in the interior of a tire during vulcanizing operations, and supplies the necessary heat, at the same time filling out the tire to its proper shape. The intense heat held in the rubber bag cures the rubber of the patch at a uniform temperature both inside and out.

The steam curing bag has been on the market, the manufacturer states, for over three years and during that period has proved its value in vulcanizing work. Re-



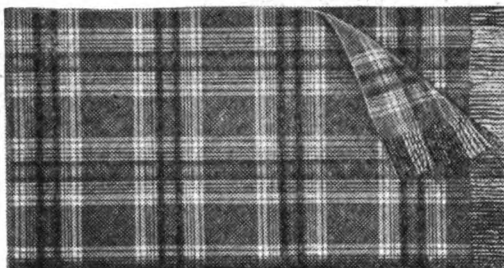
cently the company has perfected a steam curing bag of sufficient size to handle six, seven and eight-inch pneumatic truck tires.

The company states that it holds the basic patents for the manufacture of the steam curing bag, and that many of the largest tire companies are large users of them. The patents cover the United States, Canada, Great Britain, France and Germany.

Manufactured by the Steam Bag Corporation, 1545-47 Broadway, Denver, Col. Prices and literature on request.

**Woolware Robes and Shawls** for the Motorist comprise a very complete line of wool robes and shawls of different designs shown in a well illustrated catalogue which is issued by the manufacturer, whose motto is "Always the Best."

All robes and shawls are thoroughly scoured and shrunk before leaving the factory, while the warp is of cotton and the woof or filling is 80 per cent. high-grade wool stock. Robes and shawls are

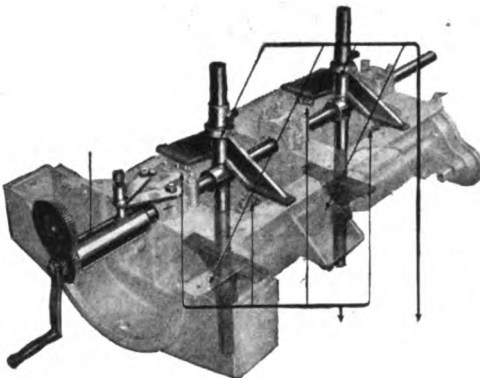


shown in varying colors and styles, including plaids, plain, grays, browns, etc. All robes and shawls are guaranteed by the manufacturer to be as represented.

Manufactured by the Beckman Co., Northern Ohio Blanket Mills, Fulton road and Paris avenue, Cleveland, O. Jobber and dealer trade solicited.

**The Peters' Universal Bearing Reamer**, including a combination boring and babbitting tool for main and connecting rod bearings, is stated to be a tool that will prove of great value to service stations and public garages. The outfit, aside from providing a ready means of reaming and babbitting the main and connecting rod bearings, also provides all the adjustments necessary, including lateral and vertical, which are very essential to obtain perfect bearings similar to those made at the factory, used when the engine is first assembled.

It is stated that this device is adapted to either four, six or eight-cylinder engines, and that it will successfully handle



engines equipped with from three to eight bearings with a positive assurance of perfect alignment.

The Peters' Universal Bearing Reamer, it is claimed, reduces the time required for reaming main and connecting rod bearings to four or five hours as compared to three to 10 days by the old hand-scraping method, while the results secured, it is stated, are equal to the manufacturer's original product.

Manufactured by the Aluminum Brazing Solder Co., Widener building, Philadelphia, Pa. Price, \$190; West of the Rockies, \$200.

**The Trex Air-Operated Valve Spring Compressor** is a tool that will appeal to service station and garage repairers who have a large amount of valve grinding to do and are equipped with power operated air compressor outfits.

Air is lead to the tool through a rubber tubing from a wall fixture and is turned on as needed by a special three-way cock

on the upper section of the cylinder of the tool. The operation of the device is simple—it is simply placed in position with the lower fork around the valve stem above the push rod, and the center pin on the top of valve. The petcock is opened and the air passes into the cylinder, forc-

**Trex Air Operated Valve Spring Compressor.**



**For Garages, Service Stations and Repair Shops.**

ing the piston down and compressing the spring. Removing the fastening pin in the valve stem and opening the valve allows the air to escape and the tool may be removed. The valve stem, spring and spring cap can then be removed also.

The tool is made throughout of steel and is stated to be strong, light and durable, and is claimed to be one of the most practical and efficient valve lifters made.

Manufactured by the Trexler Co., 1418 Walnut Street, Philadelphia, Pa. Price, \$15; West of the Rockies, \$16.

**Kozy Windshield Wings** consist of two wings of heavy beveled plate glass, which are fastened by special supports and fasteners to the side bars of the windshield and protect the passengers of the car from drafts around the edge of the shield, as well as keeping out dust and rain, it is stated.

A feature of Kozy wings is the special patented arm which holds the glass. This arm is so designed and applied that there



is no strain on the glass, and vibration and sudden jerks do not make it liable to breakage. These wings the manufacturer states, add tone to the most luxurious car, yet are practical and are being used on cars of the higher priced type as well as the medium priced.

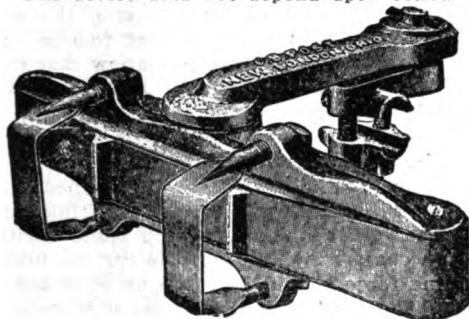
Manufactured by the Thomas-Bray Co., Cincinnati, O. Prices and literature on request. Dealers and jobbers should send for literature and special proposition.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



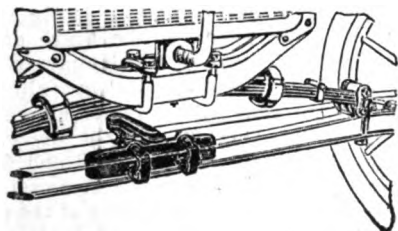
The Steer Relief for the Ford Car consists of a device which is fastened to the front axle of the car and tie rod and is claimed to prevent the front wheels from running sideways on the road. The device is also claimed to make the steering of the car much easier for the driver, as a car equipped with a Steer Relief will travel in a straight line unless turned in a different direction by the driver at the steering wheel.

The device does not depend upon coiled



springs to hold the front wheels in a straight line, but uses two flat springs instead, one at each side, which is stated to give greater strength to the device and make it more durable.

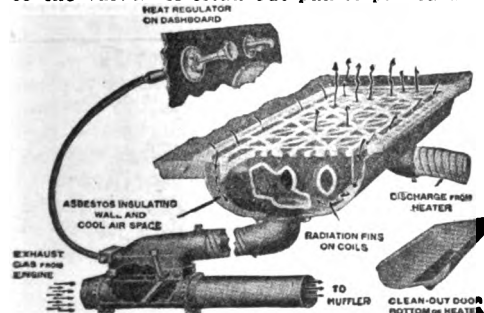
Steer Relief is made of the best of material obtainable and once correctly ad-



justed, it is claimed, will prove a valuable accessory for the Ford car. It may be installed in a few minutes time by the average motorist who is able to use a wrench.

Manufactured by the Burr Manufacturing Co., 1011-51 Power Avenue, Cleveland, O. Price, \$7.50.

The Temme Automobile Exhaust Heater for All Passenger Cars embodies several new features not usually found in heaters of this type. The heater is placed in the floor of the car, the frame setting flush with the floor boards, and becomes a part of the floor. Below the frame is the heater proper, consisting of three coils in a single unit and connected to the exhaust pipe valve by means of flexible tubing. The used gas from the heater passes through a second flexible pipe to the atmosphere. Valve regulation is accomplished by means of a dash control working in a flexible tube and connected to the valve. A clean-out pan is provided



under the heater coils, which allows the dust and lint which collects around the heater to be cleaned out at intervals.

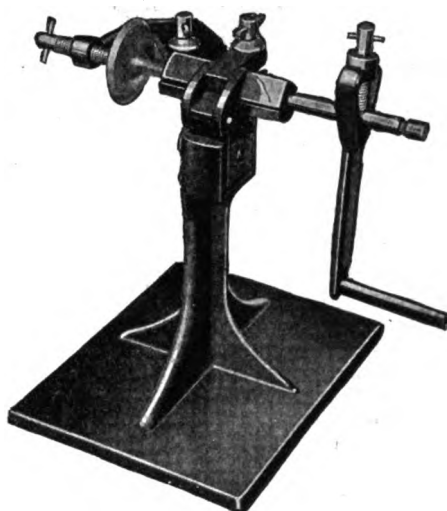
It is stated that the heater has a capacity of 384 square inches, large enough to satisfactorily heat the largest twin-six car. By means of the dash control it is possible to regulate the heat for early fall or winter driving, increasing or diminishing at will. It is stated that this form of construction eliminates the pos-

sibility of gas fumes getting into the car, or of the car catching fire.

Owners of trucks equipped with cabs fitted for all-season driving or long-distance work should find a heater of this type a good investment, as it enables the driver to keep warm regardless of outside weather conditions.

Manufactured by the Triple Action Spring Co., 2810-12 South Michigan Avenue, Chicago, Ill. Price, with full instructions for installing, \$30; extra fitting for cars having two exhaust pipes, \$10 additional.

The Universal Valve Refacer consists of a machine operated by hand which, it is claimed, will reface any valve of any degree of hardness and of any size. The machine, it is stated, will take successfully valve stems from  $\frac{1}{4}$  to  $\frac{1}{2}$  inch and heads from one inch to  $3\frac{1}{4}$  inches in diameter. The V channel type bearings, anchored in the center, will hold any valve made, it is claimed, including motorcycle



valve stems that are smaller at the bottom than at the top.

It is stated that it is possible with this machine to reface a valve in two minutes time and it is this feature that permits using the refacer for roughening out badly pitted valves before grinding, thus saving from one to two hours' time in grinding.

The Universal Valve Refacer is guaranteed to successfully reface tungsten valves.

Sold by the Fairbanks Co., Broome and Lafayette Streets, New York City. Prices on request.

MP Cables for Ignition, Starting and Lighting. All MP cables are built according to accepted standards and are guaranteed to perform efficiently the uses prescribed for each wire. There are two grades of plain rubber and braided cables, indicated by the prefixes MP and MPS. All MP types carry an insulation of 30 per cent. pure rubber, while the MPS types have a 20 per cent. special compound rubber covering. It is stated that all braided cables with the prefix MP are essentially quality wires, carrying either an extra



braided or a wrapping of cambric cloth. MP cables are thoroughly tested to withstand the ill effects of oil, heat and grease; the starting cables are further protected from acids and water. All braided cables bear a durable seal brown or cherry red finish and are saturated with varnish.

These goods are packed in convenient dust proof packages containing 100-foot coils; lamp cords in 250-foot coils. Ford assemblies and spark plug wires are packed in bundles of 100.

Manufactured by the Motor Parts Co., 15th and Mt. Vernon Streets, Philadelphia, Pa. Prices and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Jaxall Automobile Jack embodies a new idea in jack construction not heretofore used on automobile and truck jacks. The hydraulic principle is employed in its operation, oil being used for the lifting agent. This fluid is carried in a small container in the base and is pumped, by a single-cylinder pump attached to the side, into the lower part of the plunger, raising the car with ease to the height desired. A few strokes of the pump is all that is required to lift the heaviest car or truck, while provision is

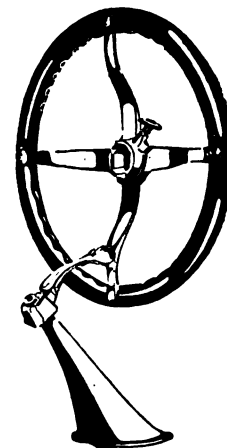


made for lowering the car with equal speed and accuracy. The Jaxall is small in size, is easily carried in the car and is ready for use at all times, the manufacturer states. The manufacturer claims that Jaxall is a quality product throughout, and that it is meeting with a ready sale wherever demonstrated.

Manufactured by the Sunderman Corporation, Newburg, N. Y. Prices and literature on application.

Gemco Full Tilt Detachable Steering Wheel follows the general design of many of the wheels of this type, but differs from others in the fact that it may be entirely removed and carried by the owner. This feature is being taken advantage of by many motorists as a means of foiling the automobile thief.

When placed in the normal position the wheel locks automatically and the manu-



facturer states that there is absolutely no chance of its getting out of order while driving.

The Full Tilt Detachable Steering Wheel is adapted to the Ford, Dodge, Chevrolet, Overland Four, Briscoe and Maxwell cars.

Manufactured by the Gemco Manufacturing Co., Milwaukee, Wis. Prices and literature on request.

## Proper Functioning of Brakes Is Essential

**T**HE motorist who gives a small amount of time daily to the inspection of the brakes will find the time well spent and especially so if on a tour. The constant use of the brakes

to the brake shoes by means of rods and clevises, called brake linkage, and it is the bearings of this linkage, because they are out of sight, that often go without oil for months at a time. Holes are

means of locking the car when standing on a grade or on the level and is rarely used when actually driving. Consequently the wear is slight and adjustment is necessary only at long intervals.

Both brakes should be kept in such a condition that either will stop the car quickly. Do not let one set remain out of order just because you know that the other set is all right, for that, too, may fall when needed the most.

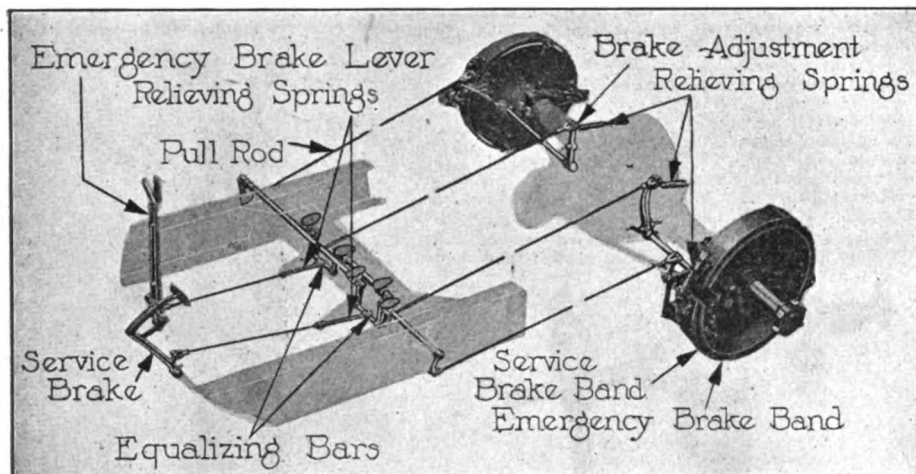
The two brake bands in each set should hold with equal force or one wheel will slip. To insure it, the pedal or lever linkage operates an equalizing bar, with other linkage to each band. With the bar straight across the car the braking force should be equal on each band.

The Ford car, which uses a planetary gearset, is equipped with a service brake operated by a pedal and fitted to one of the drums of the gearset, braking through the propeller shaft to the rear axle, while the emergency brake operates from a hand lever located at the left side of the driver through brake shoes fitted to the inside of the brake drums of the rear wheels. Adjustments are provided on the brake linkage, allowing for shortening or lengthening as required. The brake shoes of the emergency brake are of cast metal and when worn out are renewed with new castings. The service brake is adjusted at the gearset by tightening the band against the brake drum. When worn the band is removed and relined with new lining.

### Brake Lining.

Brake bands are lined with non-burning friction material, usually an asbestos fabric, interwoven with brass wires, fastened to the steel bands with copper rivets, the heads of which are counter-sunk deep into the lining, to keep the heads from contact with the drum. If the lining is allowed to wear thin the copper rivet heads will score the drum, forming shallow grooves, lessening the braking power. In this event the drum should be turned true on a lathe.

Equally important is the renewal of the brake lining before it is worn thin enough to expose the rivets to friction. This had better be done at the service



Cadillac Eight-Cylinder Brake Linkage.

wears the lining rapidly, though it may be the best and most expensive material obtainable. Constant attention to this necessary detail is essential. It is surprising how much wear brake linings will get on a car that is simply driven about town though one does not realize the fact. Barring the engine, the brakes are the most abused unit of the car system. The constant stopping and starting in traffic requires much use of the brakes and they necessarily wear down rapidly, requiring frequent adjustment. Mud and dust have every chance to enter the open bearings of the brake shafts and pull arms, causing unnecessary wear at these points. Oiling them frequently will obviate this trouble, preventing the entrance of mud and water to a certain extent.

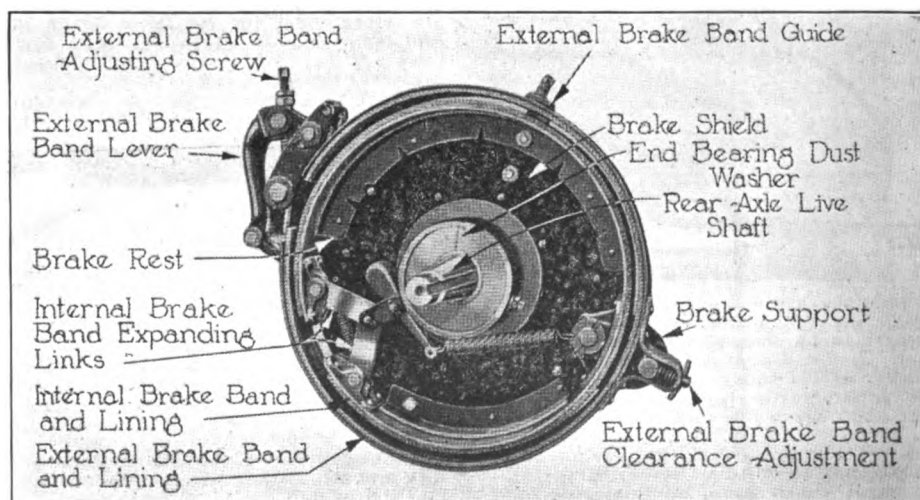
When touring in a hilly or mountainous section, the brakes should receive very careful attention each morning. Examine the brakes and linkage carefully for loose pins, wear, etc. Oil the bearings and, if the brake lining is worn thin, it will be better to lose a day's driving while new lining is being fitted than to have the brakes fail on a steep grade with the consequent danger to the occupants as well of damaging the car.

### Number of Brakes.

The modern passenger car is equipped with two sets of brakes; the service, operating from a pedal working through a slot cut in the floor of the car, in some cases attached to the same pedal that actuates the clutch and, on others, separately; and an emergency member either actuated by a separate hand lever situated next to the gearshift lever, operated by hand and fitted with a ratchet and pawl or, in some cars, by a second foot pedal at the right of the service brake and clutch pedal. Pedal brakes are fitted with a notched rack which catches over a plate fastened to the edge of floor board, locking the pedals and the brakes. This feature is applied to one or both pedals, according to the make of car. The pedals are connected

drilled through the bearings and oil is intended to be supplied from a small oil cup, squirting the oil into the opening, and supplying the bearings as the shaft is moved. Dirt sometimes fills these openings, making it necessary to clean out the opening with a small-bladed knife or drill, before the oil will enter. Careful attention to these details keeps the brake linkage in working order, and prevents failure of the brakes when they are needed the most.

Both the service and emergency brakes are provided with relieving springs, causing the brakes to release when the pedal or lever returns to its neutral position. With the exception of the Ford car, practically all makes of cars have the brakes fitted to the rear wheel drums, the emergency on the inside and the service on the outside. The reason for this arrangement is that, as the service brake is used more often, it is located on the outside to be more accessible for adjusting, relining, etc., and also because greater leverage is gained at this point. The emergency brake is used mostly as a



Service and Emergency Brakes on Rear Wheel Drum.

station and it is a fussy and tedious job. It is possible, however, to obtain the correct size linings and rivets from almost any supply house. Remove the brake bands, punch out the old rivets, noting how they were put in. Remember that the rivet heads must be countersunk deep into the lining and every rivet set up tight. It requires patience, but can be done by the novice.

Many drivers do not realize the advantage of alternating the use of brakes on long hills. Long, continued friction generates heat, which will cause the lining to smoke, char, and become brittle, wearing away easily. Alternating from the service to the emergency and back to the service again keeps down the heat. Smoke from the brake is a warning to alternate. As each car has its peculiarities, a study of brake action should be made to ascertain the best methods of handling them on your car.

The brake lining is one place where lubrication is not desirable, but every

at the top of the grade, shift into reverse, and allow the car to go down slowly, releasing the clutch as required to keep the car under control. When the bottom is reached, throwing on the ignition switch will start the engine operating, and the speed change lever can again be shifted through second into high. There is no harm in this method providing the tourist uses judgment in handling the gearshift lever and operates his service or emergency brake only as necessity requires.

## Proper Attention to Tire Valves

ONE part of a tire that is often neglected by the motorist as well as by garage or service station repairers is the valve cap and cover. These devices were added to the tire valve for a definite purpose; to assist the valve to hold the air pressure of the tire in case the valve is weakened, and to protect the cap from accumulation of mud from the road.

Treated properly this inexpensive but highly important part of the tire's mechanism will function satisfactorily throughout the life of the tube to which it is attached, but, when mistreated, often causes annoyances. When a valve begins to give trouble it may be assumed, in nearly every case as a practical certainty, that dirt has worked into it. This being so the principal attention a motorist need give the valve is to see that all dust and dirt are excluded.

There is a too common belief that it makes little difference whether the valve cap is used or not. But this idea is entirely erroneous, and motorists who do not use the valve cap are in danger of valve trouble, as there is a strong likelihood that dirt will work down into the valve. While a tire remains inflated this dirt in some cases may do no harm, but when a new inflation is made the inrushing air drives the dirt down into the valve and makes an air-tight connection impossible.

In addition to keeping out dirt the valve cap serves another useful purpose in that, if the valve should begin to leak, the cap makes an air-tight connection able to withstand a pressure up to 500 pounds. If the cap is screwed on tightly, a breakdown of the valve need cause the driver no inconvenience, as the cap is capable of preventing the tire from deflating. The one sure way to avoid valve leakage is to use the cap.

As nearly all of the large tire companies use the same make of valve, the advice given here may be followed by practically all tire users. Valve caps on bicycles, motorcycles, automobiles and trucks are all of similar size, so that if a cap is lost it can easily be replaced from another tube.

A common abuse of the tire valve occurs when removing the valve plunger. The user usually lets it drop on to the ground or floor, where it remains until he is ready to put it back into the valve tube. If dirt lodges on the red rubber washer, an uneven seating will result and

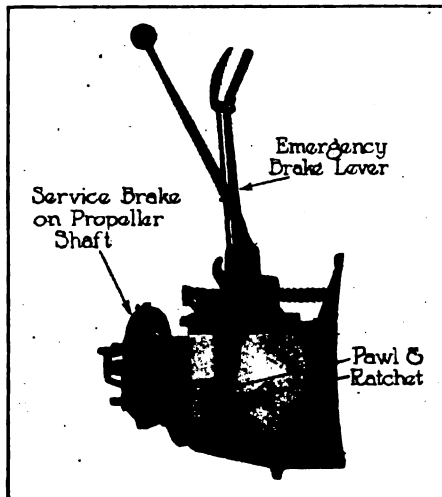
a leak will follow. If dirt has worked its way into the plunger, throw it away and put in a new one.

The valve plunger should be screwed down as far as it will go. There is no danger of breaking the plunger if the pressure is only exerted through the use of the cap as a screw driver.

Sometimes there may be a leak around the base of the valve stem. In that case the hexagon nut should be tightened. This nut should always be screwed down tightly against the washer at the base, as this makes a satisfactory seal around the opening through which the valve stem enters the tube.

The rim nut must always be screwed tight so that it closes the opening in the rim. If this is not done, dirt will work in between the tire and tube, causing the tube to wear out quickly.

An inexpensive valve tool which combines a variety of uses might well form a part of every car's equipment. This



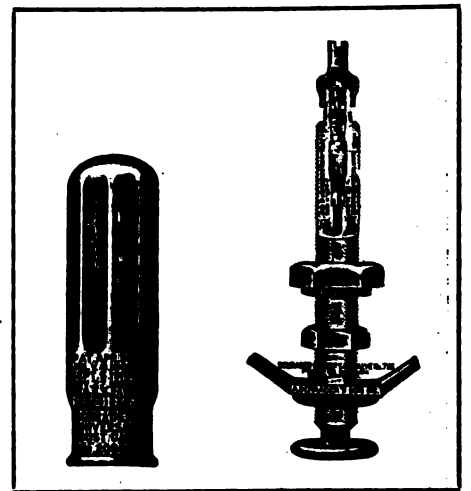
Maxwell Braking System.

other place on the brakes and linkage where there is motion should be lubricated regularly according to the manufacturers' lubrication chart and be kept clean. There is considerable wear to the clevises and pins; they may be renewed for a few cents and should not be allowed to wear to the danger point, as worn linkage rattles.

### Engine Used as a Brake.

It is a well-known fact among tourists that the engine, by working against the compression in the engine cylinders, offers a certain amount of resistance. This fact may be taken advantage of by the tourist when descending long grades and prove a great saving of the lining of the brake bands. To use the braking power of the engine the ignition is cut off, the clutch left in and also the gears of the gearset. The braking power is increased by using a lower speed than the high, either the first, or the reverse on very steep descents.

Releasing the clutch frees the car from the braking effect of the engine and it may be found that alternately letting in and releasing the clutch will give the desired result where the descent is very steep. It is necessary, when using the reverse gear, to bring the car to a stop



At Left, the Schrader Universal Dust Cap; Right Shows Construction of the Universal Tire Valve.

tool can be used for tapping the inside of the valve stem, for rethreading the outside cap thread of the valve stem and for reaming the top of the stem. It forms, at the same time, a screw driver tool for putting in or taking out valve plungers, and a deflating cap which, when screwed on the cap, will permit the deflation of the tube without the removal of the valve plunger.

Last, but not least important, is the tube which covers the valve stem and cap. This, while not so important as the valve cap, still has a duty to perform in keeping the outer threads of the valve stem from getting covered with mud or rusting from the action of water. It also protects the valve cap from mud, making it possible for the motorist to remove the cap without having dirt fall into the valve. After the tubes are inflated and the cap tightened, this cover should be replaced and tightened with the fingers.

### JACK SUPPORT.

In case of emergency when the car axle has to be jacked up on soft ground and no support for the tool is handy, take out the floor board or toe board and use this under the jack base. It will be found to serve the purpose admirably.



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devoted to the  
tractor industry and trade

Published by

The Automobile Journal Publishing Company

PAWTUCKET, RHODE ISLAND

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BEACH PATENT

A garage and repair shop necessity. Adjusts instantly, grips firmly and cannot unhook. As noted in illustration, it can be made into a two-arm puller. Also has three 12-inch arms opening to 18 inches. The



Greb Automatic Grip Puller has many uses and will soon pay for itself. Ask your jobber or write for our Ten-Day Trial Proposition. You need this tool in your business.  
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Booklets on Request

**THE BARRETT COMPANY**

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sas City Minneapolis Nashville Salt  
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**OILING SPRINGS.**

(J. H. G., Pontiac, Mich.)

My car is equipped with Disteel wheels and I find it much harder to reach the spring in the rear of the wheel than formerly with the wood spoke wheel. If there is any easier method of oiling the spring, kindly tell me.

Owners of automobiles equipped with Disteel wheels have found that it is much easier to reach the springs for oiling than formerly on cars equipped with wood spoke wheels, as the Disteel wheel is easily removed from the axle hub and when so removed leaves plenty of room for the repairer to reach the springs for oiling. It is said that a repairer is able to remove the wheel and oil the spring in much less time than formerly and with a greater certainty that the oil will reach the parts for which it was intended.

**STARTER STEEL RING GEAR.**

(K. F. P., Sayville, N. Y.)

Some time ago I saw advertised in one of your journals a manufacturer of starter steel ring gears that would take the place of broken ring gears or that could be applied over a balance wheel, making possible the installing of a starting motor in connection with the flywheel. Have mislaid the copy in question and wish you to tell me the manufacturer's address.

We believe you have reference to the Kent Auto Parts Co., Denver, Col., which manufactures a very complete line of starter ring gears of steel for this purpose. We have written them to send you the desired information.

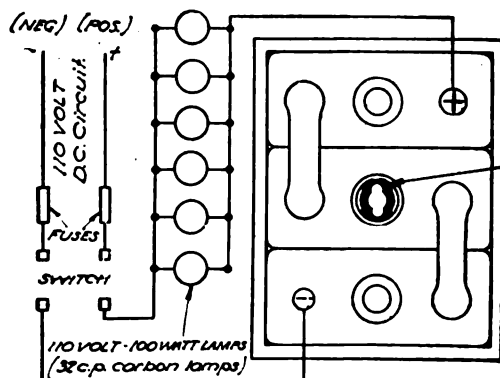
**BATTERY CHARGING OUTFIT.**

(J. W. G., Buffalo, N. Y.)

I would like directions for rigging up a battery charging outfit for my own use.

I also would like to get a formula for cleaning brass so that it will look the same as new.

Unless you are served by a direct current system you would have to use some form of a rectifier to transform the alternating current into direct. These may be purchased ready for use, and the most convenient form for you would perhaps be one that could be screwed into a lamp socket on the charging board. Directions were given, however, in the April, 1920, issue of the Automobile Journal, page 23, for a home-made aluminum rectifier.



(When Writing to Advertisers, Please Mention the Automobile Journal.)



In case you are served by a direct current system you might prefer to rig an outfit similar to the one shown, using lamps for resistance; instead of some form of rheostat.

The material required for this outfit consists of a couple of 10-ampere fuses, a double-pole, single-throw, 10-ampere knife switch, a rack containing six or eight lamp sockets, a corresponding number of carbon filament 32-candlepower lamps and some rubber insulated wire about No. 14 B & S gauge.

The fuses and switch are mounted on a board secured to the wall at a sufficient height to minimize danger of damage to the lamps. From the mains wires are run to the fuses, and from these to the upper terminals of the switch. From the lower positive terminal one wire is run to the lamp rack, and from the lamp rack to the positive terminal of the battery, and from the negative terminal to the negative terminal of the battery. The lamp sockets are all connected in parallel, that is, one wire connects to one terminal of each lamp socket and another wire to the other terminal of each socket. This completes the charging circuit.

As a 32-candlepower lamp is equal in resistance to 16 volts, you can make resistance any multiple of 16.

In regard to cleaning brass, we are giving, herewith, a formula for pickle for dipping brass parts, as well as one for a polish:

Greasy dirt should first be cleaned off the parts by boiling them in dye or potash, after which they may be dipped in a first pickle; mixed in the proportion of one quart of nitric acid to six to eight quarts of water. Then after washing thoroughly in clear warm or hot water the parts may be immersed in the second pickle composed of one quart of sulphuric acid, two quarts of nitric acid and a few drops of muriatic acid.

To polish brass, rub with vinegar and salt or with oxalic acid. Wash immediately after rubbing and polish with tripoli and sweet oil. Unless the acid is thoroughly washed off the metal will tarnish again quickly.

A good liquid polish is made as follows. To three quarts of benzine add two ounces of oxalic acid and 1½ pounds of silicate acid powder. Keep in a tightly closed glass bottle. Shake well before using. Apply with a piece of cloth. When dry, polish with a soft, clean cloth.

#### BROKEN TEETH IN DIFFERENTIAL GEAR.

(A. H., Rochester, N. Y.)

The adjustment has become loose in the differential of my model 43 Oldsmobile 1916 car, causing the axle to move endways to the left and allowing the right hand wheel to strike against the brake band and the left wheel to move away from the left band. Several of the gear teeth in the large bevel ring are broken, some at the edge of the teeth and others further in. I do not wish to purchase a new gear as I am intending selling this car soon. Kindly tell me how this gear may be repaired temporarily and how it is taken apart and assembled.

The best way out of this trouble would be to replace the defective gear with a new one, as the teeth will continue to break and chip when in use. Temporary repairs, even for a short time, are usually unsatisfactory and further breaks are quite liable to occur.

The differential gears are hung in a carrier in the differential housing in the model 43 Oldsmobile, while the axles are of the semi-floating type and are fastened to the differential. The carrier can be removed from the housing without disturbing the axles by taking off the large plate at the rear, which allows the workman to reach the differential and carrier and removal is through the plate opening.

Possibly if you do not care to put in a new gear, you might find a used one at one of the concerns which buy used cars and dismantle them for their parts. You should use care, however, to secure a gear designed for your particular model of car and one that will fit accurately the teeth of the pinion gear as, otherwise, you would probably have more breakage to contend with. It is possible where the teeth are only nicked on the outer edge to grind the edges of the teeth to a bevel on a carborundum wheel and the gear can be then used for some time and not cause further breakage, but

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**TEN DAYS' TRIAL.** If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

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where the teeth are broken part way down this method will not help as the rough edges of the teeth at the break will cause them to continue to chip off.

When assembling the new gear on the differential hub flange be sure to use rivets of a size that will fill the holes in the ring gear and the flange and head the rivets down tight, as looseness at this point will be very perceptible. In adjusting the gears see that they are not too deeply in mesh, for if they are they will "howl" when the car is driven. Adjust them so that the teeth mesh but do not touch bottom and so that they may be easily spun with the hand. Adjustments for this axle will be found at each side of the differential and by using them properly the differential gear may be placed either further away or closer in mesh with the pinion gear.

All grease and sediment should be removed from the differential housing and the case thoroughly cleansed with kerosene or gasoline, allowed to dry and refilled with fresh lubricant, as it will be found that more or less metal from the broken gear teeth will be held suspended in the old lubricant and if left in the case this metal will be carried in between the teeth of the new gear and more breakage will result.

After adjusting the gear make sure that the adjustments are locked tight with the lock nuts provided for this purpose so that the accident which you mention cannot occur again.

### RECHARGING FORD MAGNETO IN CAR.

(W. J. K., St. Louis Mo.)

How is a compass used in recharging a Ford magneto in car from battery?

What is a high speed and low motor and what are the advantages?

The process of recharging a Ford magneto by means of a compass and batteries while still in the machine is very intricate and difficult; a great number of batteries should be used to get results and results so obtained are seldom favorable.

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We judge from your letter that your magneto does not seem to be giving proper current. Do not jump to the conclusion that it is demagnetized; this is very seldom the case. Try cleaning the contact point which screws into the tops of the case just under the dash over the flywheel, unscrew it from the case and see whether it is clean or not. Quite often lint or dirt collects at this point and stops the flow of current.

Disconnect the wire leading from this point to the dash and connect a short length of wire with the point touch it to the engine or casing while some one else turns the engine over at a moderate rate. If you get a spark while the engine is being turned over you may rest assured that your magneto is not demagnetized.

If you find that it gives no spark and that the magneto is demagnetized, a cheaper proposition for you will be to buy new magnets from the factory. By trying to magnetize them yourself you are very apt to ruin all of the coils of electro magnets and the steel magnets.

In practise an automobile engine running below 1500 revolutions per minute is considered as a low speed engine; any motor running above 2500 revolutions per minute is considered as a high speed engine.

A comparison between the advantages of a high speed engine over a low speed engine and vice versa is a difficult subject to handle. The engines of each type are designed for a particular class of work and are so designed as to be most efficient when used for that particular class.

As an instance of this it is generally conceded that a high speed engine should be used in an aeroplane. A low speed engine is generally used for boat propulsion. This is not an arbitrary rule, however, and is used to show the difficulty of making a comparison of the relative values of high and low speed engines.

A high speed engine usually requires a finer adjustment, a better balance of rotating parts, a more efficient cooling and oiling system, better ignition and specially designed fuel system than a low speed engine.



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Absence of annoying road damages?*

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NEW YORK

## TYPES OF VALVES.

(G. S. M., Highland Park, Mich.)

Kindly publish diagrams showing the types of rotary valves and flexible valves that have been used in the past.

The rotary type valve, as used in the past, has taken several different forms. The one shown in the illustration has probably been the most successful, although other forms have been developed that have done successful work. Rotary valves of this type consist of two long, round shafts running along the sides of the cylinder heads. Holes are bored through the shafts in such position that they come opposite to openings into the cylinders or combustion chambers and

same speed as the camshaft should turn.

Engines of this type may have either one long shaft, cut in such a manner that the exhaust and inlet openings are cared for, or two shafts, as shown, one for the exhaust side and the second for the inlet.

## Disc Valves.

There are still other engines made with a type of valve known as a rotary disc valve. These are made in the shape of a circular metal disc, as large around as the head of the piston and about one-quarter of an inch thick. They are placed in the cylinder head and fastened to gears so that they rotate or turn completely around and are driven by a small master gear meshing with one of the larger gears. The valves rotate at one-eighth crankshaft speed and give four intake openings and four exhaust openings for each of the four cylinders. The special claim made for this type of valve is that it provides an unusually large valve opening while giving all the advantages of a valve-in-head engine. This type valve has been used on the Guy engine of the Hackett car.

## REMODELING A FORD CAR FOR RACING.

(A. B. D., Arctic, R. I.)

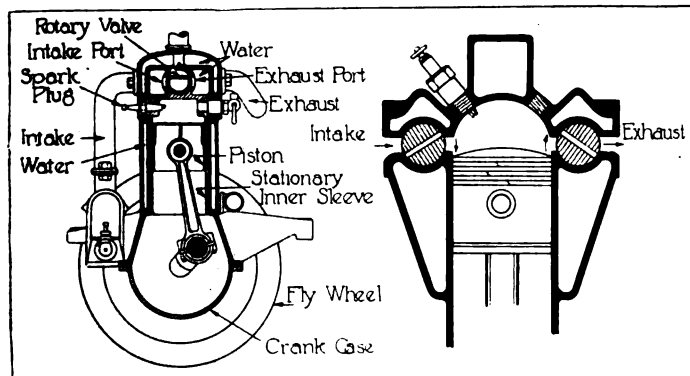
How can I remodel a Ford car for racing? Shall I change the camshaft? What is the best way to drop the engine or frame so that the car will hold the road better?

The question of weight is the first one to be considered. All unnecessary parts, such as windshields, tops, fenders, etc. should be removed. Wire wheels may be substituted for all-wood wheels. Do not, however, under any circumstances, sacrifice strength for lightness.

You may mount the chassis on the axles, using cantilever springs, which will enable you to drop the frame a number of inches. It is not advisable to alter the engine mount.

The gear ratio in the rear axle may be changed. Gears for changing the Ford rear axle to different speed ratios are being made by a number of concerns and can be obtained from good supply houses.

It will not be advisable for you to change the design of the engine in any way. We advise you to use the regular stock camshaft in the engine. Aluminum pistons and special leak tight piston rings may be substituted at an advantage.



at the same time open into the intake pipe leading to the carburetor or to the exhaust pipe according to the position that the piston is in and the stroke that it is making.

This long shaft or valve is set in a position to open the inlet orifices at the same time the inlet valve should open in a poppet valve engine, to close the inlets at the time the inlet valves should close, and to open and close the exhaust holes at the same time that the exhaust valve should open and close in a poppet valve engine.

The rotary valve is driven from the crankshaft by gears or chains so that it turns half as fast as the crankshaft, just the

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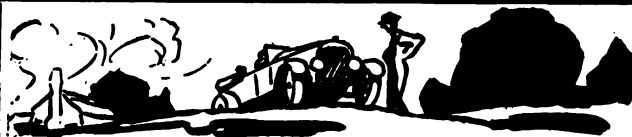
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*K-00 Special for gears  
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### JACKSHAFT TROUBLE.

(D. J. M., Greenwich, Conn.)

I have a Brasier 30 horsepower chain drive car and am having trouble with the drive. When the car is traveling along on high speed, every now and then it seems as though something "lets go" in the rear, catches and then goes all right for a time. The trouble is intermittent and is not noticeable at times for days, then it will occur two or three times. It sometimes sounds as though gears were being stripped. I have examined the gears in the gearset and they seem to be all right, the master and pinion gears in the jackshaft seem to be in good condition. Can you tell me what the matter may be?

From what you say it would seem that the trouble lies in the differential assembly and may be due to a number of reasons. First, try the following test: Either jack up both wheels or remove the chains from the sprockets, and with an assistant turning the sprocket in one direction on one side, turn the other sprocket in the opposite direction, slowly and carefully. There should be very little lost motion and the drive from one side to the other should be regular and smooth. If you find that there is any point where the turning of one side does not affect the other, it is an indication that one of the gears in the differential is either stripped or partially so, and must be replaced. The same experiment should be tried both with the clutch in and with it out, being careful not to have the spark set so as to cause the engine to start.

If the trouble is not due to broken differential gears, note whether or not the pinion drive gear bearing is seated. If it is not, due to the powerful thrust of the pinion, it will be pushed away from the master gear, giving a similar effect. A similar result is caused by a loose master gear, as of one improperly bolted or riveted to the differential housing.

Now carefully clean out the jackshaft housing (small pieces of metal often get lodged in the housing and work between the gears). See that none of the housing rivets or bolts extend into the case far enough to contact with moving parts.

If the trouble is not in the jackshaft assembly, examine the chain. Be sure that the sprockets are in line. If they are not in line the chain will be forced to "ride" the sprocket at certain points. Chain troubles can easily be found upon inspection.

### REMOVING GREASE FROM THE ENGINE.

(G. A., Royal Oak, Mich.)

Kindly tell me, through the columns of the Journal, what I can use to clean oil and grease from an automobile engine. Also what kind of paint should I use to repaint the engine. Will the common asphaltum black varnish be suitable for this purpose and would it be necessary to use a sizing to make the paint hold to the metal surface?

Kerosene and gasoline are the two most used agents for removing grease and oil from automobile engines, as they not only cut the grease and oil, but at the same time wash it from the metal surfaces. Either substance can be applied with a paint brush, cloth, or, better still, with one of the compressed air cleaning guns sold by jobbing houses for this purpose.

The liquid is placed in a container to which is attached an air pump, and a few strokes of the pump is sufficient to give the required pressure for several minutes' use of the gun. It is claimed that this is the quickest method of cleaning yet devised and that the work can be done easily without soiling the hands.

Suitable paint for repainting the engine can be purchased of practically any automobile supply house. What is essential is that it be quick drying and will not catch fire from the heat of the engine. Special paints are manufactured for this purpose. An oil paint can be used, but should have drier placed in it, so that it will dry quickly, otherwise it will take considerable time to dry on the metal. We would not advise the use of asphaltum varnish, as this ignites at a low temperature and is quite liable to burn off with the heat developed by the engine.

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Christmas morning this year will dawn bleak and gray for thousands of little kiddies, whose only Santa Claus will be the stalking spectre of Tuberculosis, exacting his toll of 150,000 lives this year in our country alone.

Can we—can you—reflect on our Christmas Spirit with a sense of righteousness if we have failed to include Christmas Seals with our gifts?

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Tuberculosis**



**Use  
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Each penny seal helps finance your national, state and local tuberculosis associations who are devoting all that science and human devotion have in them to combat this preventable and curable scourge.

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**AUTOMOBILE  
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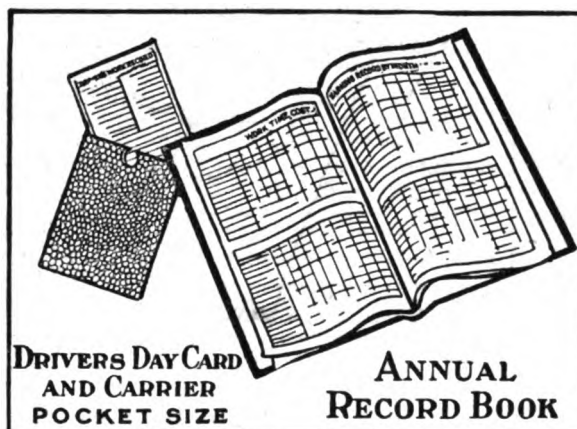
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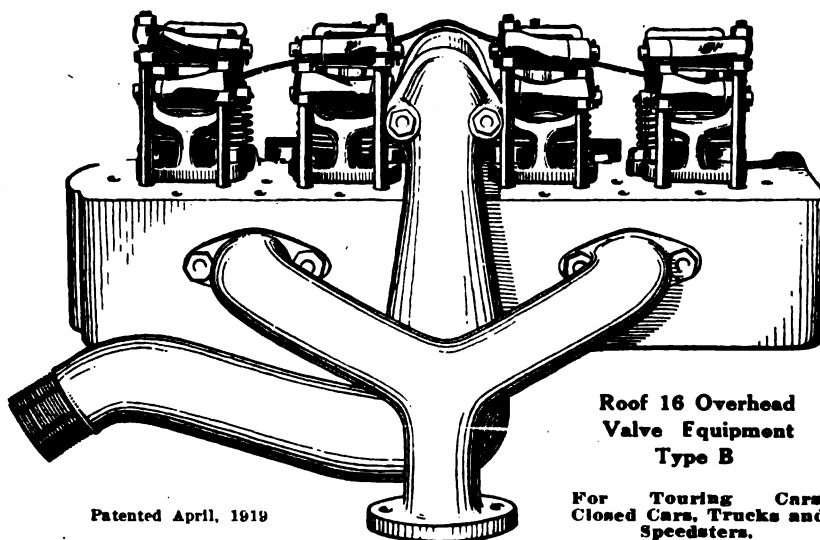
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# POWER and SPEED ROOF 16 OVERHEAD VALVE EQUIPMENT for FORD MOTORS



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Roof 16 Overhead Valve Equipment Type B

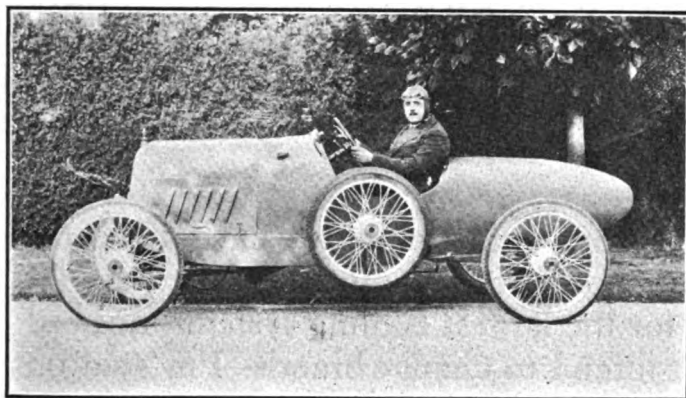
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Babylon, L. I., N. Y.

Antonio Beretta, of Babylon, Long Island, N. Y., in his beautiful record breaking Laurel equipped Ford speedster, capable of making 76 miles per hour.

## Ford Racing Car Speed Kings

From the hundreds of fast Ford car drivers we mention the names of a few of those who have won laurels through the use of our equipment and some with speed records approaching that of the highest priced racing cars in the world, ranging from 70 to 97 miles per hour, and who on mile and half-mile tracks have closely approached the world's record with their speed cars:

Paul M. Booser.....Windber, Penn.  
Tracy D. Mohny.....Pittsburg, Pa.  
Ben Lawell.....Columbus, Ohio  
W. L. Frazier.....Washington, D. C.  
Herbert Black.....Webster City, Iowa  
John Proctor.....Washington, D. C.  
Rolly Blair.....Shelby, Neb.  
Joseph C. Hayes.....San Francisco, Cal.  
Antonio Beretta.....Babylon, L. I., N. Y.  
Hugo Goedthe.....Milwaukee, Wis.  
W. C. Phalgraph.....Cheyenne, Wyo.  
Milner Motor Car Co.....Monroe, La.  
C. F. Goltry.....Roann, Ind.  
Fred Dawson.....Springfield, Ill.  
W. C. Norris Motor Car Co.....  
.....Oklahoma City, Okla.  
Alvin A. Pfeiffer.....Clatonia, Neb.  
J. Ross Castendyck.....La Salle, Ill.  
Fred Hank.....Cheyenne, Wyo.  
L. E. Kerbs.....Otis, Kan.  
Phil M. Kepley.....New Albany, Ind.  
A. Malby.....Daytona, Fla.

Robert Cusick.....Denver, Col.  
Chas. Skinner.....Willow Bunch, Sask.  
Joe Meison.....St. Charles, Ill.  
Sisk Motor Co.....Darlington, S. C.  
Dean C. Montgomery.....Atlanta, Ill.  
J. Christiansen & Son.....Galveston, Tex.  
Bozanni Bros.....Los Angeles, Cal.  
J. Marshall Yeats.....Champaign, Ill.  
Kirby Horton.....Cleburne, Texas.  
N. H. Steele.....Racine, Wis.  
John G. Banzhaf.....Greenwich, Conn.  
Richard O. Fay.....Xenia, Ohio.  
R. C. Wheeler.....Chattanooga, Tenn.  
W. J. Meagher.....Medford, Ore.  
Bert Wellington.....Casper, Wyo.  
N. C. Burdett.....Stuart, Ia.  
Perry La. Merte.....Kalamazoo, Mich.  
Albert Willshaw.....  
.....Ft. Wadsworth, N. Y.  
Willard Brothers.....Ponca City, Okla.  
Roy A. Tolen.....Carlow, Mo.  
W. H. Hooker.....Bay Side, L. I., N. Y.

Cliff Duhme.....Cincinnati, Ohio  
Brinker & Sheffer.....Gibsonburg, Ohio  
Roscoe J. Whitney.....Leominster, Mass.  
Frank Richardson.....Segourney, Ia.  
Roy A. Scofield.....Council Bluffs, Ia.  
Rister Garage.....New Harmony, Ind.  
Dennis Auto Co.....Ottawa, Kan.  
Tunica Motor Co.....Tunica, Miss.  
Irving Donohoe.....Washington, D. C.  
Speedster Shop.....Los Angeles, Cal.  
William Erwin.....Corcoran, Cal.  
Don Husted.....Marshall, Okla.  
Charles N. Davis.....Piedmont, Mont.  
Antone Bertoglio.....  
.....Twin Bridges, Mont.  
D. E. Snider.....Middletown, Ohio  
Roy M. Barzem.....  
.....Thief River Falls, Minn.  
Bay View Auto Co.....Cheriton, Va.  
A. Jackson.....Bloomington, Ill.

Get Our Special Circular on Long Mileage Tires and Illustrated Folder Showing Our Full Line of Special Touring, Roadster and Racing Bodies for Fords.

Write for Our Agency Terms and Prices TODAY

**THE LAUREL MOTORS CORPORATION**  
ANDERSON, IND.

## What Harris Told the Salesman



"Sorry, old man, but I'm not in the market for any other radiator repairers. I've got one here and it's a dandy. Retails at 75 cents and is **guaranteed** to repair cooling system leaks quickly--and for good. It sells easily, and gives me a quicker turnover at a bigger profit."

"But ---", started the salesman.

"No 'buts' about it, my friend. To buy your brand I'd have to carry about six different sizes---tying up more of my money. One can of SE-MENT-OL is large enough for the largest cooling system---no need to stock other sizes. And I don't intend to change brands—I'm 'sold' on

## SE-MENT-OL

( LIQUID AND POWDER )



SE-MENT-OL is the **original** self-acting radiator repairer.

SE-MENT-OL Liquid, kept in the radiator, will keep the cooling system leak-proof for the life of the car.

If you're not already handling SE-MENT-OL and other NORWESCO products, take a tip from Harris. He used to sell several brands—now he's pushing only NORWESCO.

**Retail price, Liquid or Powder, 75 cents**

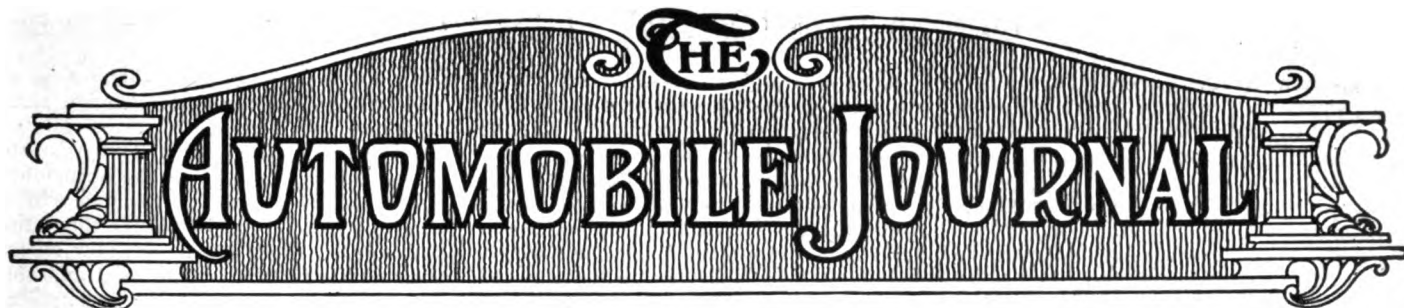
*Write today for dealer's proposition and discounts.*

**THE NORTHWESTERN CHEMICAL CO.**

730 State Street,

Canadian Factory: Montreal

Marietta, Ohio



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PAWTUCKET, R. I., OCTOBER, 1920.

NO. 3.

# Car Makers Optimistic Over Outlook of Industry

## *First-Hand Statements from Officials of Representative Manufacturing Concerns — Comparison of Old and New Prices Shown in Tabulated Form.*

**I**N ORDER to get a first-hand and comprehensive idea of the effect of the recent unsettled state of the automobile market following the cut in prices, the Automobile Journal sent out questionnaires to the leading motor car makers of the country asking for information in regard to changes in prices, guarantees and statements setting forth opinions of coexistent conditions, probable demand for new cars and prospects for future business.

The following are selected from the replies from the officials of many of the most representative automobile manufacturing concerns of the country:

**Allen Motor Car Co.**—"Has not reduced price of any of its models and does not contemplate doing so. As many others have stated, there is no fundamental reason why prices should be reduced at this time as the cost of manufacturing has not been reduced one iota. On the other hand, there have been certain advances which would make more sensible an advance instead of a reduction. We have guaranteed our price to the trade and to the consumer against a decline until March 1, 1921. We cannot help but feel that after election, and surely after the first of the year, there will be a reaction in the automobile business,

but that the public will be more wary of buying and more critical as to the kind of car they will put their money in. They will want a car that will be good for more than one or two seasons on the same principle that a man buying a piece of real estate now realizes that he is paying a good price for it and that it must do him for a long time if he is to

**American Motors Corporation**—"No further reduction before April 1. "In reference to the prospects in the automobile business at the present time, this company feels certain that the year 1921 is going to be, if not the best, at least on a par with any automobile year we have had, as the demands for cars are going to exceed the output by a large majority."—J. H. Gilles, assistant sales manager.

**Anderson Motor Co.**—"While conditions as they exist today in the automotive industry are not the most active, yet we can see a gradual improvement, which is not confined to any one section. The outlook, both politically and financially, indicates activity and stabilization of market conditions by Feb. 1. Price levels have been reached for a sufficient time ahead to allay hesitancy on the part of those who have been withholding the placing of specifications. Emphasis of this condition is showing through our

The accompanying statements from prominent automobile manufacturers are in reply to questionnaires sent out by the Automobile Journal to all the representative producers of passenger motor vehicles of the country, and graphically reflect all sides of the causes and effects of the present situation in the industry, as well summarize the outlook for future business.

The tabulations of changes in prices, which is also compiled from figures supplied by officials of the car-building concerns, shows that 34 other makers followed, with substantial reductions in the prices of their products, the announcement of the cut made by the Ford Motor Co. on Sept. 21, while, on the other hand, seven manufacturers have increased their prices on one or more models.

Practically all of the best known manufacturers of the United States have issued statements of some character or made guarantees as to the maintenance of present prices, etc.

The truck industry has not been affected to so great a degree and only 11 makers have announced reductions. But one or two tire manufacturers have made any cuts and the reduction in the price of accessories, material and equipment, which was expected in some quarters to follow in the wake of the break in the pleasure car market, has also not materialized as yet to any extent.

However, it seems to be the consensus of opinion that the crisis of the flurry is now passed; that the automobile industry will speedily and readily adjust itself to the new conditions; that prices will settle down to figures based on the fundamentals of actual cost of material and labor; and that it will be practically on nearly a normal footing again by spring.

While there is wisdom in the admonition of some that the situation should not be taken too seriously, there is no doubt that the general buying public will still continue to stand somewhat aloof until the feeling becomes more universal that rock bottom has been reached.

realize on the investment. We believe the cheaper type of car will not sell so readily. The well built, medium priced car will be in the greatest demand. For that reason we are very optimistic for the future of the Allen and are anticipating a return of better conditions at a no-distant date."—F. I. Lackens, assistant advertising manager.

distributors' organization and their prospects, as the definite fixing of our prices to March 1, 1921, has enabled the closing of deals that have been hanging fire, and brought about a more liberal offering from our distributors."—H. J. McCullough, manager of the sales promotion department.

**Apperson Brothers Automobile Co.**—No reduction. Present prices guaranteed to July 1, 1921. No likelihood of any changes in price during the next calendar year.

**Brewster & Co., Inc.**—Unchanged. Prices guaranteed to Jan. 1, 1921. "We do not expect any decrease unless there should be an unexpected decline in labor prices. It is our opinion that the present lull in automobile sales is only temporary and that, after election, there will be a revival."—F. H. Buell, sales manager.

**Briscoe Motor Corporation**—Unchanged. Prices guaranteed to April 1, 1921. "Our opinion is that conditions will improve, gradually becoming stable by early spring. Buying will be slow this fall and winter."

**Buick Motor Co.**—Prices guaranteed for some months.

**Chevrolet Motor Co.**—"We are continuing our present prices for 1921."—J. H. Newmark, manager advertising division, general sales department.

**Cole Will Advance If Necessary.**

**Cole Motor Car Co.**—"In view of the agitation occasioned by the recent publication of numerous price changes, we beg to inform you there will be no reduction in Cole prices. In 1918 this company adopted a policy of constantly manufacturing a finer motor car, adding thereto from time to time such improvements and refinements as have proven to be of value to our owners. It is absolutely contrary to our basic programme to let any condition interfere with this purpose to build a car that at all times represents the highest value which it is possible for us to afford for the price it bears. Furthermore, it is not the intention of this company to let anything

cars has been at a standstill and we do not look for any material change along this line for a couple or three months. On the other hand, we believe that the present trying times that the automobile manufacturer is passing through will in the long run serve to stabilize the industry and to a point that from now on automobiles will be manufactured and sold upon the same sound, basic principle as that of any other standard manufactured article."—L. I. Hatfield, president.

**Crow-Elkhart Motor Corporation**—Prices on all models reduced to pre-war figures. The action was taken, it was stated, because of general conditions in the industry.

**James Cunningham, Son & Co.**—"We guarantee until July 1, 1921, that there will be no reduction in the price of our cars. At the present writing we have no idea of making a reduction at that

## COMPARISON OF PRICES OF PASSENGER CARS ON

INCREASES.			
Champion	Old	New	Ch'ge
Special Five-Passenger..	\$1550	\$1595	\$45
Tourist .....	1350	1350	..
<b>Lexington</b>			
Touring .....	\$2185	\$2285	\$100
Thorobred .....	2255	2285	..
Lex-Sedan .....	2585	2785	200
<b>Pierce-Arrow</b>			
48-Horsepower Touring..	\$7750	\$8000	\$250
38-Horsepower Touring..	7250	7500	250
35-Horsepower Limousine	8550	8880	250
48-Horsepower Suburban	9250	9500	250
48-Horsepower Vestibule	9450	9700	250
38-Horsepower Vestibule	8750	9000	250
Brougham .....	8750	9000	250
Seven-Passenger Sedan..	8550	8880	250
Four-Passenger Sedan...	8550	8880	250
<b>Rover</b>			
Seven-Passenger .....	\$3350	\$3450	\$100
<b>Saxon-Duplex</b>			
Touring .....	\$1785	\$1895	\$110
Coupe .....	2795	2795	..
Sedan .....	2685	2795	110
<b>Sayers</b>			
Avondale Touring Car...	\$2095	\$2195	\$100
Derby Roadster.....	2595	2595	..
Glendale Sedan.....	3295	3295	..
<b>Stearns-Knight</b>			
Three-Pas. Roadster....	\$2450	\$2550	\$100
DECREASES.			
<b>American</b>			
Five-Passenger Touring..	\$2485	\$2395	\$90
Roadster .....	2485	2395	90
Seven-Pas. Touring.....	2550	2475	75
Sedan .....	3650	3495	155
Coupe .....	3450	3295	155
Four-Passenger .....	2650	2595	55

American Beauty			
Touring E-6-55.....	Old	New	Ch'ge
Roadster F-6-55.....	\$2450	\$2250	\$200
Sedan G-6-55.....	2450	2250	200
Artcraft E-6-55.....	3600	3600	..
3000	2800	200	
<b>Bell</b>			
Five-Passenger .....	\$1595	\$1495	\$100
<b>Bour-Davis</b>			
Five-Passenger Touring..	\$2825	\$2535	\$290
Seven-Passenger Touring	2875	2585	290
Three-Passenger Roadster	2875	2585	290
<b>Bush</b>			
Touring E-4.....	\$1495	\$1245	\$250
Touring De Luxe 6.....	1995	1575	420
<b>Chalmers</b>			
Five-Passenger Touring..	\$1945	\$1795	\$150
Roadster .....	1945	1795	150
Sport Car .....	2145	1995	150
Four-Passenger Coupe...	2645	2595	50
Seven-Passenger Touring	2095	1945	50
<b>Chandler</b>			
Touring .....	\$2095	\$1895	\$200
Despatch Car.....	2175	1975	200
Coupe .....	3095	2895	200
Sedan .....	3195	2995	200
Limousine .....	3695	3495	200
<b>Cleveland</b>			
Touring .....	\$1585	\$1435	\$150
Roadster .....	1585	1435	150
Sedan .....	2595	2445	150
Coupe .....	2495	2345	150
<b>Columbia Six</b>			
Five-Passenger Touring ..	\$1795	..	..
Sport Model, Five Wire	..	1945	..
Wheels .....	..	1945	..
Roadster, Five Distel	..	1945	..
Wheels .....	..	2895	..
Five-Passenger Sedan...	..	2895	..
Four-Passenger Coupe...	..	2895	..

Comet			
Touring C-53.....	Old	New	Ch'ge
Sedan C-53-2.....	\$2350	3975	325
<b>Crow-Elkhart</b>			
Four-Cylinder Touring...	\$1495	\$1295	\$200
Four-Cylinder Sport....	1545	1345	200
Four-Cylinder Roadster..	1495	1295	200
Six-Cylinder Sport.....	1795	1595	200
Six-Cylinder Sedan.....	2395	2395	..
Six-Cylinder Roadster...	1745	1545	200
Six-Cylinder Touring....	1745	1545	200
<b>Davis</b>			
Touring .....	\$2185	\$2085	\$100
Sport Car.....	2225	2125	100
Special Sport.....	2350	2250	100
Five-Passenger Sedan...	3185	3085	100
Four-Passenger Coupe...	3185	3085	100
Three-Pas. Roadster.....	2225	2125	100
Three-Passenger Special.	2350	2250	100
<b>Essex</b>			
Touring .....	\$1795	\$1595	\$200
Roadster .....	1795	1595	200
Sedan .....	2650	2450	200
Cabriolet .....	2500	2100	400
<b>Ford</b>			
Runabout .....	\$550	\$395	\$155
Runabout with Starter...	625	465	160
Touring .....	575	440	135
Touring, Electric Starter.	650	510	140
Coupe .....	850	745	105
Sedan .....	975	795	180
Chassis .....	525	360	165
<b>Franklin</b>			
Touring .....	\$3100	\$2600	\$500
Two-Passenger Roadster.	3050	2400	650
Four-Passenger Roadster	3100	2500	600
Brougham .....	4300	3500	800
Sedan .....	4350	3600	750
<b>Gardner</b>			
Touring .....	\$1285	\$1195	\$90

**Bush Motor Co.**—Reduced prices guaranteed to March 1, 1921.

**Cadillac Motor Car Co.**—Prices unchanged.

**Chalmers and Maxwell**—Walter P. Chrysler, chairman of the reorganization committee of the Maxwell and Chalmers companies, states that those companies are in excellent condition to establish new prices for the reason that under the reorganization plan inventories have already been substantially depreciated. Full confidence is expressed that the replacement of inventories can be accomplished upon a basis to justify the lower prices made.

**Champion Motors Corporation**—"The outlook is good for good, low priced cars. Lowered prices are stimulating the demand.

stand in the way of the development of our product, and we will not hesitate to advance the price of our car if by so doing we are able to add to its refinement and efficiency."—J. E. Roberts, general sales manager.

**Cortland Cart & Carriage Co.**—Prices guaranteed to July 1, 1921. "There is no change in the list price of the Hatfield. We might further add, in this connection, that the present list price of the Hatfield was established in December, 1919, and no advance has been made since that time. We have been reticent about making an advance in the list price with the hope that we might carry the matter along until there was a recession in the price of materials that we are consuming. Since the announcement of the cut in the Ford cars the demand for new

time."—C. A. Baird.

**Daniels Motor Car Co.**—Prices unchanged.

**Dodge Brothers'** policy has ever been to give full value for price asked. There will be no reduction in the present prices of Dodge Brothers motor cars. Newspaper reports to the contrary are absolutely untrue."

**Expects Usual Demand in Spring.**

**Dorris Motor Car Co.**—"There has been no recent increase or reduction. We have guaranteed our prices until March 31, 1921, and from present indications feel sure that there will be no reduction. While business is rather slow just now, we look forward to the customary demand in the spring. We have reduced our output about 50 per cent. and do not anticipate any increase until about Jan.



1. We are not at all pessimistic regarding the outlook and feel that the readjustment of business came at a good time."—Webster Colburn, vice president and general manager.

**Dort Motor Car Co.**—"No change in price on any models. We guarantee against any price reduction which we may make on all 1920 models. The price of the Dort car is reasonable and fair; therefore, there will be no reduction made by this company. There has been as yet no break in material or labor costs that would warrant any price reduction on the Dort car. On the contrary, materials have been purchased by us, and by all motor car manufacturers, for 1921 production at a very considerable advance as a whole over 1920 material costs. Therefore, unless those purchase contracts are treated by the purchaser as 'Scraps of paper,' or the seller

"No reductions have been made or contemplated. Our present prices are guaranteed until April 1, 1921. Our prices have not been raised through the general period of price advances, but remain the same as they were early in the year. Therefore, there can be no reductions until there is some decided change in the cost of labor and materials. Sales are doubtless going to be retarded for some time to come, but we are doing a fair volume of business, to which we have adjusted our production and feel that after the present transition period there will be a satisfactory and permanent volume of sales."—U. G. Manning, vice president.

**H. H. Franklin Manufacturing Co.**—"The way to readjust is to readjust. Lower prices have to come and the way to get them is to inaugurate them at once. Reductions can come only from

gestion in trade channels regardless of any temporary sacrifice of profit."—H. H. Franklin, president.

**Gardner Motor Co., Inc.**—"The Gardner Light Four is not a war product and never has had an inflated price. The manufacturer for the present will be selling at cost. The Gardner Motor Co. has decided to make this reduction not because such a step is in any way justified by its present manufacturing conditions, but because it has recognized a widespread sentiment on the part of the American public for a general reduction and, in anticipation of the cooperation of its sources of supply, desires to assist in an attempt to bring this about."—Russell E. Gardner.

**General Motors Corporation**—"General Motors has never favored or encouraged profiteering. On the contrary, it has always given to the motor buying

## WHICH CHANGES HAVE BEEN MADE SINCE SEPT. 20

	Old	New	Ch'ge
Roadster .....	1285	1195	90
Sedan .....	2345	2145	200
<b>Grant</b>			
Touring .....	\$1750	\$1550	\$200
Roadster .....	1750	1550	200
Coupe .....	2550	2450	100
Sedan .....	2550	2450	100
<b>Hudson</b>			
Seven-Passenger Touring	\$2600	\$2400	\$200
Four-Passenger Roadster	2600	2400	200
Cabriolet .....	3450	3000	450
Touring Limousine.....	3925	3625	300
Limousine .....	4275	4000	275
Coupe .....	3575	3275	300
<b>Jordan</b>			
Sport Roadster.....	\$2850	\$2650	\$200
Five-Passenger Touring	2850	2650	200
Brougham .....	3950	3700	250
Five-Passenger Sedan....	3950	3700	250
Seven-Passenger Touring	3075	2875	200
<b>King</b>			
Touring .....	\$2835	\$2725	\$110
Foursome .....	2835	2725	110
Road-King .....	2850	2740	110
Limousine .....	4235	4035	200
<b>Kline Kar</b>			
Sport 6-5-5-K.....	\$2600	\$2290	\$310
Auxiliary 6-5-5-K.....	2600	2290	310
Roadster 6-5-5-K.....	2600	2290	310
Sedan 6-5-5-K.....	3600	3290	310
Coupe 6-5-5-K.....	3560	3250	310
<b>Liberty</b>			
Five-Pas. Touring Car...	\$1985	\$1795	\$190
Two-Passenger Roadster	1985	1795	190
Four-Passenger Speedster	2085	1885	200
Coupe .....	2850	2825	25
Sedan .....	2900	2850	50
<b>Locomobile</b>			
Seven-Passenger Touring	\$8900	\$7550	\$450

	Old	New	Ch'ge
Four-Passenger Touring	9000	7650	1350
Seven-Pas. Limousine....	10,500	9150	1350
Seven-Pas. Landaulet....	10,500	9150	1350
<b>Lone Star</b>			
Five-Passenger 4-30.....	\$1545	\$1395	\$150
Five-Pas. (Beauty Top)...	1745	1595	150
<b>Mailbohm</b>			
Phaeton .....	\$1695	\$1575	\$125
Roadster .....	1695	1575	125
Coupe .....	2500	2395	115
Chassis .....	1550	1460	90
<b>Maxwell</b>			
Touring .....	\$1155	\$995	\$160
Roadster .....	1155	995	160
Sedan .....	1895	1695	200
Coupe .....	1795	1595	200
<b>Merced</b>			
Raceabout .....	\$4675	\$3675	\$1000
Touring .....	4950	3950	1000
Sport Model.....	4950	3950	1000
Runabout .....	4950	3950	1000
Coupe .....	6150	5150	1000
Touring Limousine.....	6650	5650	1000
<b>Moore</b>			
6-42 Touring.....	\$2285	\$1885	\$400
6-42 Roadster .....	2285	1985	300
6-48 Touring .....	2385	1985	400
6-48 Roadster.....	2485	2085	400
6-48 Sedan .....	3385	2985	400
6-48 Coupe.....	3385	2985	400
6-68 Touring.....	2950	2485	465
6-68 Roadster.....	3050	2585	465
6-68 Sedan .....	3950	3485	465
6-68 Coupe.....	3950	3485	465
<b>Norwalk</b>			
Five-Passenger .....	\$1385	\$1285	\$100
<b>Overland</b>			
Touring .....	\$1035	\$895	\$140
Roadster .....	1035	895	140

	Old	New	Ch'ge
Coupe .....	1525	1425	100
Sedan .....	1675	1475	200
<b>Paige</b>			
Five-Pas. Touring 6-42...	\$1925	\$1770	\$155
Four-Pas. Sport, 6-42....	2165	1990	175
Two-Pas. Roadster, 6-42.	1925	1770	155
Five-Pas. Sedan, 6-42....	2875	2645	230
Three-Pas. Coupe, 6-42...	2775	2525	250
Seven-Pas. Tour. 6-66....	2995	2795	200
Five-Pas. Sport, 6-66....	3095	2895	200
Seven-Pas. Sedan, 6-66...	3995	3750	240
<b>Stanley</b>			
Five-Passenger Touring	\$4875	\$3950	\$925
Seven-Pas. Touring.....	4875	3950	925
Four-Passenger Coupe...	6575	5650	925
Seven-Passenger Sedan...	6700	5775	925
Chassis Only.....	4325	3400	925
<b>Studebaker</b>			
Special Six Touring.....	\$1875	\$1750	\$125
Two-Passenger Roadster.	1875	1750	125
Four-Passenger Roadster	1875	1750	125
Special Six Coupe.....	2850	2650	200
Special Six Sedan.....	2950	2750	200
Big Six Touring.....	2350	2150	200
<b>Velle</b>			
Five-Passenger 48.....	\$1985	\$1885	\$100
Two-Passenger 48.....	1985	1885	100
<b>Westcott</b>			
Lighter Six Touring.....	\$2690	\$2290	\$400
Lighter Six Roadster.....	2690	2290	400
Lighter Six Sedan.....	3890	3390	500
Larger Six Touring.....	3190	2990	200
Larger Six Sedan.....	4790	4590	200
Larger Six Limousine...	4890	4690	200
<b>Willis-Knight</b>			
Touring .....	\$2300	\$2195	\$105
Roadster .....	2300	2195	105
Coupe .....	2950	2845	105
Sedan .....	3050	2945	105

voluntarily revises contract prices downward, there can be no justification for any motor car manufacturer to reduce prices unless he has been profiteering, which means that he has been receiving an excess profit on his product. If there be any such manufacturers this is a most opportune time for them to properly adjust prices to the sound values of their products."—J. D. Dort, President.

**Dupont Motors, Inc.**—"The price of the DuPont automobile has not been reduced. The present list prices are the same as those announced some months ago, before production started. DuPont distributors and dealers are guaranteed against reduction in prices prior to April 1, 1921.

**Elgin Motor Car Corporation**—"Prices guaranteed to June 1, 1921.

**Elkhart Carriage & Motor Car Co.**—

the top down. The manufacturer has to make the first move and, as a result, the fabricator and producer of raw materials will fall in line. Necessarily the Franklin Co. will take a temporary loss on materials on hand which were purchased at figures out of line with the new price scheduled for the company's automobiles. We shall endeavor to obtain readjustments of existing contracts with vendors to meet the new conditions and to place new contracts at figures below what we have been paying. Wages at the Franklin plant will not be affected by the lowering of prices, but will remain at their present level. Our action also has in mind the responsibility of manufacturers to keep labor employed, and the only way it can be done is to set prices on a basis that will relieve con-

public splendid value, which is alone responsible for the enormous business enjoyed by the corporation."—W. C. Durant, president.

**Halladay Motors Corporation**—"Prices guaranteed to Jan. 1, 1921. "As we have found no reduction in material, with but several minor discounts to date, and as labor remains at the same figures, we can see no reason for a reduction in the price of automobiles excepting by those who might have been in the large profit class. We see, from time to time, announcements of reductions in price of certain makes of automobiles, who frankly state in the same announcement that labor will not be affected. In order for the parts makers to reduce the price of their respective parts, it would be necessary for the reduction of labor, to lower

the price of same, otherwise these parts must remain at the same figures, which necessarily would command the present price of the automobile."—Thomas E. Huth, president.

**Hanson Motor Co.**—Prices guaranteed to March 1, 1921.

#### Reduction the Maximum Possible.

**Hare's Motors, Inc.**—"In putting into effect the reduction in the price of Locomobile and Mercer cars of \$1350 and \$1000 respectively, we decided to make this reduction the maximum one possible instead of temporizing with half-way measures, even if it is necessary subsequently to revise our prices upward. It seems to us that the business difficulties which are confronting the American manufacturer today are not due to a real shortage of demand, but rather to suppressed demand occasioned by the insufficient purchasing power of the country through the deflated value of the dollar.

"What we all desire is a rapid return

ly strong engineering organization, and then to effect manufacturing economies through increased sales, which are made possible by better distribution facilities, thus enabling us to offer the public still greater quality than they have received heretofore and at lower prices, with mutual benefits to distributors and ourselves. In view of the recent business depression, I believe we can take no little pride in the fact that the sales of both the Locomobile and Mercer for the last 90 days have been considerably in excess of the sales of these companies in any corresponding period of former years. But improvements in both products, plus increasing costs of labor and material, have more than kept pace with the increased production and, except for the obvious duty of collaboration among manufacturers to restore the morale of business, even at considerable temporary sacrifice, there would be no justification whatever for a price reduction at this time.

until Jan. 1, 1921, and do not feel that there will be any change in our prices beyond this period unless we can see a material reduction in commodity prices. If there is, of course it is always our attitude to give the benefit of this reduction in cost to our distributors. Business for the future looks very good to us. On our new models, which we have greatly improved, the demand at the present time is very brisk. We do not look for any let-up in the demand; as a matter of fact we look for greatly increased sales."

**Hupp Motor Car Corporation**—A telegram to the Hupmobile Co. of New England from the Detroit factory reads: "Prices of Hupmobiles are based on costs of labor and material. Until such costs are lowered there can be no reduction in the price of our product without sacrificing quality, which we will not do. We will guarantee present list prices until March 1, 1921."

**International Motor Co.**—"The demand for motor trucks is maintaining its steady increase in spite of what would seem to be adverse general market conditions."

**Jackson Motors Corporation**—Prices guaranteed to July 1, 1921.

**Jordan Motor Car Co.**—"The Jordan Motor Car Co. has from the beginning maintained a policy of constant improvement in its product, aiming at a high degree of service to Jordan owners. It will continue to be the Jordan policy to command the respect and confidence of the public by adhering to this permanent ideal of service. Knowing this to be the only guarantee of success, in view of the present world-wide demand for service at lower cost, the Jordan Co. makes its contribution to this justifiable public demand."

**Kentucky Wagon Manufacturing Co.**—Prices of Dixie Flyer guaranteed to May 1, 1921.

#### Business Will Increase After Shows.

**Kenworthy Motors Corporation**—No increase or decrease in prices as this concern has just gotten into production in the last couple of months. In regard to business prospects, the president, C. Y. Kenworthy, writes as follows: "We feel that business will be quiet for the next three months, but will steadily increase after the national automobile shows. We believe there will be an arbitrary reduction in prices, but it will be necessary for high grade cars to advance their prices again possibly after the first of the year on account of the fact that those that have reduced have mostly done so to encourage sales, and not because they have been able to get an immediate reduction on all materials. If there is any noticeable reduction in high grade cars in general it will be because of the price of labor being reduced as well as food stuffs and household necessities."

**Lafayette Motors Co.**—"Lafayette prices, which were very recently announced, of course will not be reduced. In establishing our present prices we speculated on a downward trend in our costs and assumed that six or eight

## REDUCTION IN TRUCK PRICES

Day-Elder	Old	New	Chge
One-Ton	\$2100	\$2100	....
1½-Ton	2450	2300	\$150
Two-Ton	2950	2750	200
2½-Ton	3150	2950	200
3½-Ton	3950	3700	250
Five-Ton	4950	4600	350
<b>Diamond T</b>			
1½-Ton	\$2800	\$2450	\$350
Two-Ton	3485	2835	650
3½-Ton	4825	3925	900
Five-Ton	5675	4615	1060
Five-Ton Special	5900	4800	1100
3½-Ton, with Body	3100	2715	385
<b>Federal</b>			
One-Ton	\$2600	\$2500	\$100
1½-Ton	2825	2725	100
Two-Ton	3150	3025	125
3½-Ton	4100	3950	150
Five-Ton	4750	4600	150
Light-Duty Tractor	3325	3200	125
Heavy-Duty Tractor	4300	4150	150
<b>Ford</b>			
One-Ton Chassis	\$640	\$545	\$95
Fordson Tractor	850	790	60
<b>Gramm-Bernstein</b>			
Model 15, 1½-Ton	\$2250	\$2050	\$200
Model 65, 1½-Ton	2775	2725	50
Model 20, Two-Ton	3275	3175	100
Model 25, 2½-Ton	3875	3575	300
Model 30, Three-Ton	4975	4575	400

Model 35, 3½-Ton	4775	4375	400
Model 50, Five-Ton	5875	5275	600
<b>Indiana</b>			
1½-Ton	\$2425	\$2290	\$135
Two-Ton	3140	2950	190
2½-Ton	3350	3150	200
3½-Ton	4150	3750	300
Five-Ton	5075	4775	300
<b>L. M. C.</b>			
2½-Ton	\$2950	\$2540	\$410
<b>Patriot</b>			
1500 to 2500 lbs.	\$1990	\$1785	\$205
3000 to 5000 lbs.	2785	2450	335
5000 to 7500 lbs.	3845	3450	390
<b>Selden</b>			
1½-Ton	\$2460	\$2360	\$100
2½-Ton	3550	3425	125
3½-Ton	4325	4175	150
Five-Ton	5770	5600	170
<b>Standard</b>			
One-Ton	\$2475	\$2250	\$225
2½-Ton	3520	3100	420
3½-Ton	4410	4000	410
Five-Ton	5250	4800	450
<b>Stewart</b>			
¾-Ton	\$1450	\$1295	\$155
One-Ton	1850	1650	200
1½-Ton	2450	1995	455
Two-Ton	3075	2495	580
2½-Ton	3200	2575	625
3½-Ton	4100	3395	705

to normal business conditions so that merit may have the opportunity to obtain sufficient finances for development. I believe the reduction in prices by other manufacturers and ourselves, whether analyzed or not, is in reality a simple recognition of the fact that a reduction in prices is the only thing that can increase the purchasing power of the dollar to a point where there is sufficient money to properly finance the business heads of the country. If we are correct in reading the spirit of the times, then it is not only our duty, but the duty of every manufacturer, to hasten normal business conditions by taking an immediate loss, if necessary, rather than occasioning a far greater, if more protracted, loss through an endeavor to resist fundamental conditions stronger than ourselves.

"When we took over the Locomobile and Mercer companies early this year, our objective was to maintain and improve their quality through our unusual-

"Nevertheless, we are convinced that such a procedure is today both sound and constructive and that the greatest ultimate profit is to be earned by taking a present loss. It is our earnest hope that before the period expires within which, under existing conditions, we can afford to maintain the revised price list, our business will have expanded sufficiently and our costs will have dropped enough to warrant our making the new prices permanent. If not, we shall have no recourse but to revise it again and, this time, upward."—Emlen S. Hare, president.

**Hamlin-Holmes Motor Co.**—"Our car is in a class by itself as it is a front-driven car, and we do not believe that the inactivity that is now existing in the automobile industry will affect us in any way or do we believe it will affect any of them but a short time."

#### Business for Future Looks Good.

**Holmes Automobile Co.**—"We have guaranteed our prices to our distributors

months from now we shall be operating under improved manufacturing conditions. These prices reflect an average estimated basis of cost over a period of several months. If they were based on costs today they would be considerably higher. If our premise is not substantiated and our production costs remain at their present high level, a price increase will be necessary. It is our policy to build a car which is stable in quality and consequently in price. Price stability was uppermost in our minds when we allowed ourselves to be influenced by a forecast and an anticipated equalization of labor."

**Lexington Motor Co.**—"We are only listing three models, as the programme on the balance of the models which we will produce has not been definitely settled. The change in price of the Model S touring car took effect Oct. 1. The change in price on the Lex-Sedan took effect Sept. 10. We are guaranteeing our present prices to distributors to and including Jan. 1. We had already made this announcement on Aug. 2. We are very optimistic as regards the future of the automobile business, and in our opinion, while there is a temporary slow-up in sales, we believe that immediately after the presidential election sales will again resume their normal state."—Jay Dewey, general sales manager.

#### Reductions Represent Overcharges.

President Frank B. Ansted states, in addition: "In our opinion, all reductions so far represent overcharges exacted from a market clamoring for more production. We have not heretofore made our prices on the basis of what the market would bear and are unwilling now to make a reduction because others are sur-rendering excessive profits. Model S is intrinsically 20 per cent. more expensive than Model R pre-war model. On this basis Model S is now priced less than 17 per cent. higher than pre-war prices. Most other companies making cuts are producing exactly the same models as before the war at 30 to 50 per cent. more than prewar prices, after the recent cuts."

**Liberty Motor Car Co.**—Reduced prices guaranteed to July 1, 1921. "It is the belief of officials of the Liberty Motor Car Co. that conditions will greatly improve in the automobile business. We believe that the total consumption of cars for next year will be greater than this year's, especially in the case of cars similar to the Liberty Six. Following the presidential election and completion of the handling of the crops, we believe a reaction will set in strongly in our favor, especially since car manufacturers, such as ourselves, have readjusted prices to the lowest possible levels. We think that the buying public will manifest its confidence in us by a great deal of buying. Following the National shows in New York and Chicago and with the coming of spring, we look for an especially big stimulus in sales of cars."—Verne E. Burnett, advertising department.

**Lincoln Motor Car Co.**—Commenting on price reductions, Wilfred C. Leland,

vice president and general manager, said that he could foresee no condition for a long time that would permit any reduction in the price of the Lincoln car, and he added that conditions which seemed to warrant reductions in some instances had already been anticipated by his company, and that those conditions had been taken into consideration in establishing the recently announced Lincoln prices.

**McFarlan Motor Corporation**—Vice President B. M. Barrows states that his company brought out a new model, the first of July, of longer wheelbase, higher power and more careful detailed coach work, in which was embraced all the reduction in prices of both labor and material that could be hoped for or expected in the next season; consequently no comparison in prices can be made.

#### Reduction Caused by a Psychological Factor.

**Maibohm Motors Co.**—"We have issued a statement to our distributors and dealers stating that we do not anticipate any change of price before Jan. 1, and also guaranteeing our distributors protection if it is necessary for us to make a change. We believe we are in bearing with the other automobile manufacturers when we state that the recent price reduction has been caused more by a psychological factor than because of any other reason. It is very evident that, before the manufacturers can make any great reduction in price, both labor and material will have to be materially reduced. Therefore, I believe that I am stating the opinion of the officers of the company when I give it as my opinion that the Maibohm will always be priced just as low as possible, depending upon conditions which will be beyond our power to control."—W. W. Jeffrey, sales department.

**Mitchell Motors Co., Inc.**—Prices unchanged. Guaranteed to March 1, 1921.

**Monitor Motor Car Co.**—Prices unchanged.

**Nash Motors Co.**—"Our policy has always been to give the consumer the best automobile and best truck we could build at the least possible cost. We have never asked a dollar more simply because we could get it. In view of the fact that there is no reduction today in the price of materials or labor entering into Nash products and that there is no possibility of any reduction for some time to come that can substantially affect manufacturing costs, the policy of the Nash Motors Co. will be to absolutely maintain its present prices on both passenger cars and trucks to at least July 1, 1921. Our prices have never been inflated and, therefore, cannot be reduced. For example, the increase in Nash cars since 1917 has been 31 per cent., while the average increase in the cost of automobiles during that time has been 76 per cent., and living expenses generally, according to government figures, have increased 104 per cent. Our increase has really been only 24 per cent. when you consider that cord tires and other equipment have been added as standard."—C. W. Nash, president.

**Ohio Motor Vehicle Co.**—No reduction in price of Ferris cars.

**Olds Motor Works**—Prices guaranteed from Oct. 1, 1920, to July 1, 1921. Those makes that had a "war price," had to come down. Oldsmobiles were priced on costs. Things have settled to normal.

**Packard Motor Car Co.**—"The Packard Co. has not reduced its prices and does not expect to inasmuch as the manufacturing costs of its vehicles cannot permit of any reduction at this time. In the event of a future reduction, however, we have insured our prices up to July, 1921, in such a way as to give our customers the benefit of such a reduction should one occur."—A. G. Medlicott, assistant to the general sales manager.

#### No Economic Grounds for Reduction.

**Paige-Detroit Motor Car Co.**—Announcement is made by Harry M. Jewett, president, of new prices which went into effect on Sept. 27. "There are no economic grounds to justify these reductions in price," said Mr. Jewett. "The price of Paige cars has always been based on the cost of first class materials, expert workmanship and a fair profit. Materials from which cars are now being made were, of course, purchased months ago. There has been no reduction in cost since then. In fact, basic factors, like steel, transportation and coal have gone up. However, to support what seems at this time a worthy movement and to contribute a telling blow to the high cost of living, the Paige is willing to make its own sacrifices; and, at the new prices we are announcing, will cheerfully accept a loss."

**Pan-American Motor Corporation**—Prices, which were reduced \$200 on all but the sedan G 6-55 model, are guaranteed to July 1, 1921.

**W. A. Paterson Co.**—Prices unchanged and guaranteed to March 1, 1921. "There has been no change in the price of material up to this time that would justify us in lowering our prices. There seems to be a trend that way, but it will be quite impossible for us to make a reduction until we in turn have had lower prices from our source of supply. In our opinion the present depressed condition, which applies not only to this industry, but even down the line to retail business of every description, will not change materially until the financial situation in this country has been adjusted. We naturally feel that too much of our money has gone abroad, leaving our banks very low on reserves and on deposits. Until a change has been brought about in that direction there will not be any very great improvement in the business conditions generally."—W. R. Hubbard, treasurer.

#### May Be Necessary to Increase.

**Peerless Motor Car Co.**—"The policy of pricing Peerless product has been fair to the purchaser and no attempt has been made to establish the very high prices which have been possible since the war. This policy will be evident by comparing Peerless prices with the prices charged for competing products during the entire cycle of price advance and at the present time. This policy

has resulted in an excellent demand from users and has prevented accumulation of excessive stocks. Costs are still rising, and it may be necessary for us to again increase our prices, although we hope this will not be necessary. We cannot reduce prices under present conditions and certainly do not intend to do so."

#### Piedmont Says Must "Stand Pat."

**Piedmont Motor Car Co.**—"We have advised our agents that we cannot reduce the price of our car and must 'stand pat.' Our assumption is based as follows: Although some manufacturers can reduce prices and have done so, there are others who cannot, and we belong to the latter class. Our cars are built up to a standard, from which the price is set, after allowing ourselves a small margin of profit. Increases in both material and labor cost, from time to time, since our last prices went into effect, together with additional cost of refinements and improvements that have taken place in the meantime, have reduced the so-called small profit to a minimum. In fact, we are only breaking even at present day prices. There are only two ways in which we could reduce the price of our cars. First, material and labor costs would have to become normal, and there is no immediate relief in sight for either of these conditions inasmuch as the price of food and clothing must drop before labor prices decrease. The steel market still has a tendency upward instead of downward. The next solution would be to cheapen our product, and this, we refrain from doing. We believe that the prospective purchaser will consider value before price, and we believe further that salesmanship and the merit of the product will have more bearing than the price on future sales. It is our opinion that the manufacturers who are now reducing their prices have been profiteering during the war period, and although they are reducing their prices, we believe they are still making a handsome profit.

"It is our opinion also that a reduction in price may bring a few immediate sales, but as soon as the novelty wears off we believe sales will be as scarce as ever. We are not speaking for the industry as a whole, but we are giving you our unbiased opinion as it affects us. It is our aim to give the best dollar for dollar value of any product on the market, and in order that we may give this value we must uphold our present day prices. If we were to cheapen our product in order to reduce the price, in all fairness to the customers, we would be obliged to advise them accordingly, and we know they do not want a cheaper product."—H. W. Kriner.

**National Motor Car & Vehicle Corporation**—Contemplates no reduction in price. Distributors and dealers authorized to guarantee all retail buyers that if any reduction was made the factory would refund the amount of such reduction until July 1, 1921. "While not attempting to speak for other manufacturers, states President George M. Dickson, "it is certain that the prices of National

cars cannot come down until there has been a material future reduction in the costs of material and labor."

#### Demand Rapidly Returning to Normal.

In regard to the business outlook, Fred Wellman, advertising manager of the National Corporation, writes as follows: "Now that the recent price flurry that disturbed the automobile industry is about over, we find that the demand for our cars is rapidly returning to a more normal basis. Our production of closed cars for the fall and winter months is proceeding about as usual, and we anticipate no difficulty in going through with our scheduled plans. It is a little early to make predictions for next year; however, at the present rate of improvement, business promises to be unusually good. The automobile shows will prove as big a factor in stimulating the demand as usual, we think, inaugurating a selling season that we expect to be more successful than any we have yet experienced."

**E. A. Nelson Automobile Co.**—New prices undetermined.

**Noma Motor Corporation**—No reduction.

**Nordyke & Marmon Co.**—The following announcement is made through Frank E. Wing, New England distributor of Marmon cars: "There is no real reason for any automobile manufacturer to reduce prices at this time unless they have been receiving an excess profit. Marmon won't cut prices because labor conditions and high cost of raw materials will not permit it. Walter C. Marmon, president of the Nordyke & Marmon Co., has wired to all dealers, stating that there will be no reduction in the price of Marmon cars, and that the price is guaranteed until July 1, 1921. He adds, that the Marmon car has never been sold because of its price, but because of the car itself. In comparing the Marmon car prices during the price advance period with those of other makes of cars, you will see that no attempt was made by Nordyke & Marmon Co. to get the very high prices that were possible during and since the war, which means that they are never influenced by price fluctuation on any other make of cars. Quality and individuality have always been foremost in the minds of the designers of the Marmon. Because of the quality of workmanship and material entering into the manufacture of the Marmon high-speed motor, the highest honor possible to be conferred upon any industrial organization was given to the workers of the Nordyke & Marmon Co. during the period of building the Liberty motor. It is the intention of this company to work with the idea of trying to improve the Marmon car rather than to cut the quality, which would be the only way they could cut price."

**Norwalk Motor Car Co., Inc.**—Price on Model 4-30 KS five-passenger pleasure car reduced \$100; prices on Model 25 E one-ton and 35 E 1½-ton trucks are unchanged; guaranteed to March 1, 1921.

**Oakland Motor Car Co.**—"At this time when the public mind is disturbed by

sensationally announced price reductions of automobiles and other merchandise and commodities, we desire to give assurance to those who require personal passenger transportation, such as provided by the Oakland Sensible Six, that we do not anticipate reducing the price of our cars. Starting with the production of the raw material required, and continuing through to the finished product, over 80 per cent. of the cost of an Oakland Sensible Six is labor. Over 80 per cent. of the cost of all other automobiles produced in large quantities is labor. When wages paid to labor are reduced, or when labor produces more per man, then may manufacturers of honestly priced automobiles legitimately consider the reduction of their selling prices. We have not heard of any instance where automobile workers are receiving lower wages. If wages may be lowered eventually, we see no immediate trend in that direction. In the production of so essential a factor in our economic life as the passenger automobile—increasing as it does the personal efficiency of owners by nearly 57 per cent.—we believe the workers, whose toil produces the vehicle, should be largely beneficiaries of the constructive character of their work. If abnormal demand has been responsible for over-enthusiastic expansion and inflated profits in certain instances, the wage earner should not be made to suffer as he must if powerful forces effect lower automobile prices whether or no. True enough, there have been many instances of inflated prices.

#### Belated Shaking Out of Abnormal Profits.

True enough, abnormal profits must be eliminated. And that is what has been going on all around you recently—the price reductions you have witnessed in automobiles and other merchandise are the belated shaking out of the abnormal profits. The normal profits are still there. Manufacturers whose goods have been priced on actual cost to produce, plus normal profit, have no inflated figures with which to appeal to the uninformed public in sensational announcements of 'price reductions.' Prudent, studious buyers will not be misguided by erroneous principles. We are able to say, with great conservatism, that the present price of the Model 34 C represents an increase, due solely to increased cost of labor and material of 27.4 per cent. (Since 1915.) Larger production each year has kept this increase at a low figure. Compare this increase with the increase of other automobiles and with commodities—with the things you buy every day. Nowhere have we been able to find a standard article of merchandise that has increased as little in selling price as the Oakland Sensible Six. In the event of unexpected reductions in the cost of the labor and material that enter into the construction of the Oakland Sensible Six to a point where we may properly and legitimately reduce the list price of our cars between Oct. 1, 1920, and May 1, 1921, we will refund to every Oakland purchaser who buys within the above mentioned period of time the amount of such reduction."



**Will Not Sacrifice Quality.**

**Pierce-Arrow Motor Car Co.**—In connection with the announcement of price increase, Col. Charles Clifton, chairman of the board of directors, made the following statement: "This increase in price is dictated solely by our determination to make no sacrifice in the quality of the Pierce-Arrow car. We have made this new schedule operative Oct. 15, 1920, in order that present orders covered by contracts can be filled. It must be understood that our problems are not similar to those of the manufacturers of popular priced cars, where quantity output decides the price. We make a comparatively limited number of passenger cars, aimed to appeal to a discriminating patronage. We cannot attempt to apply economies of quantity production that would be readily acceptable in models selling at lower prices. Like all manufacturers, we are eager to market our product at as low a price as possible, commensurate with a reasonable return on the investment, but must naturally regard the maintenance of quality as the factor of determining importance."

**Pilot Motor Car Co.**—Has not reduced the prices of its cars and does not intend to do so. On the other hand, it does not intend to increase the prices unless it should build, at some later date, a larger model, which would naturally sell at a higher price. Has guaranteed that there will be no decrease until July 1, 1921.

**Premier Motor Corporation**—Has not reduced prices and has guaranteed them to Jan. 1 on the present models. "The prospect for future business is more or less an unknown quantity. When we say future, we mean the next 60 or 90 days. After that we believe that the buying American public will readjust themselves and that we will have several years of sane and prosperous business. We do find that even now we're able to sell more closed cars than we can manufacture. On open cars the situation is entirely different and while we find that our distributors are making quite a few sales, they are not reordering to any extent this time of year. We believe that any automobile manufacturer that has been working on a conservative basis and is in position to finance himself until after the first of the year will easily make up the losses that necessarily must come with the present depression."—E. W. Hurd, director of sales.

**Rauch & Lang, Inc.**—Has made no change in prices of old models of Rauland cars, but expects to increase on its new series.

**Reo Motor Car Co.**—No reduction possible at this time. Prices guaranteed to April 1, 1921.

**Revere Motor Car Corporation**—No reduction.

**Root & Vandervoort Eng. Co.**—No reduction on R. & V. Knight cars. Guaranteed to Jan. 1.

**Public Will Not Go Back to Stage Coaches.**

**Saxon Motor Car Corporation**—"We have not changed our prices, inasmuch as the present prices when announced were based on present costs of labor and material with a legitimate margin of

profit added, and inasmuch as we have not been taking advantage of the public demand we have no excess profits to deduct from our list prices. We do not believe there is anything the matter with the automobile industry other than the hysteria and panic that some manufacturers seem to be in who have apparently been caught profiteering and who have hastened to take the industry before the public and nailed it to the cross as an industry in which profiteering has been unbridled and rampant. Naturally, such actions in any industry tend to seriously disturb public confidence in the industry and where there is lack of confidence there is usually lack of buying and we believe that just as soon as automobile manufacturers as a whole recognize the value of public confidence and recognize the sound and basic principles of soundly priced merchandise and are able to reflect to the public that this industry is operated by men who are prepared to operate on a legitimate basis, buying will commence again because we do not believe that the public as a whole are at all inclined to go back to horses, trolley cars and stage coaches. We believe that there are just as many people in this country who want automobiles and intend to buy them as there ever were and probably more every day. But we cannot blame the public for not buying cars on what to them appears to be a falling price market. Cut prices are the psychological requirements when there are overstocks of merchandise and overstocks of merchandise usually result from two causes: Either because the public has laid off the merchandise because its value is not properly reflected in its price or else because the producers have produced far in excess of the normal demand for the particular merchandise. We do not know of any industry in which price cutting has stimulated business. We do know of many instances where price cutting has had the reverse effect.

"As to the prospects for future business, we believe it rests entirely with the automobile manufacturers as to how soon they want to establish themselves in public confidence so that the buyer may purchase an automobile with the assurance or at least with the confidence that he is not going to pay one price today only to find himself out on a limb, as far as prices are concerned, tomorrow."—C. H. Page, director, sales advertising service.

**Sayers & Scovill Co.**—New prices guaranteed to April 1, 1921.

**Scripps-Booth Corporation**—Prices unchanged and guaranteed to May 1, 1921.

**Automobile Business Singled Out by Bankers.**

**Skelton Motors Corporation**—Price on Skelton automobiles was increased \$50 last May, since which time no increase or decrease has been made, and there will be no decrease unless there is a reduction in the price of material. Price is guaranteed to Jan. 1 and in special cases extended to March 1, 1921.

"We do not anticipate very much activity in the buying of automobiles until at least after election and in fact believe it will be some time during the

spring of 1921 before conditions will become so improved as will make it possible for manufacturers to get into a reasonable production. Banking conditions have gradually become such that it is utterly impossible for automobile men to secure loans upon new automobiles and in almost every case we find bankers demanding that automobile distributors and dealers reduce their loans at almost any cost. While all businesses seem to have felt the heavy hand of curtailments of credit, the automobile business seems to have been especially singled out as being more or less non-essential and the cause of the extension of credit to be tightened."—W. A. Chapman, vice president and general manager.

**William Small Co.**—Prices on Monroe cars guaranteed to spring.

**Standard Steel Car Co.**—Prices on Standard cars are unchanged and guaranteed to April 1.

**Stanley Motor Carriage Co.**—"This reduction on each model of \$925 from the previous list price is not warranted by costs, since there has been no corresponding reduction in materials, labor or transportation. We believe, however, that good business and public sentiment, demanding an end to abnormal prices, dictate reductions which will command the cooperation of dealers, buyers and material makers, and thus assist in restoring business to its normal, healthy state. Because of Stanley stored power, control by throttle only, the ability to burn low-grade fuels and our uninflated production, we were perhaps in stronger position to maintain prices than any other manufacturer save one, and he initiated this movement."—P. Warren, vice president.

**Waiting for Prices to Reach the Bottom.**

**Stanwood Motor Car Co.**—No change in prices. "As to present conditions, this is a dull time of the year in general and in particular the action of the Federal Reserve bank slowed up the automobile business and Ford's cut in price put the finishing touches on the job by making people hold off in their purchases of automobiles until they felt that the prices have really reached the bottom. It seems to us that the spring will bring some life into the automobile business, but decline in prices of products of every kind are going to slow up sales until the bottom actually has been reached. We look for no miracle to happen after election, which has nothing to do with present conditions, and we look forward to a very quiet year in 1921."—N. D. Thompson, Jr., president.

**Will Increase Quality Rather Than Decrease Price.**

**F. B. Stearns Co.**—Statement of George W. Booker, president, to Stearns-Knight dealers: "Answering your inquiry as to the possibility of a decrease in price of our cars, you are advised that absolutely no decrease in our present prices can be made. It is an absolute fact that cars we are producing today are costing us more than they did two months ago. It is equally true that material going into cars which we will manufacture beginning Jan. 1, 1921, will be even greater, and the present indications

are all favorable to an advance in prices at that time. You of course know that when prices on automobiles were being advanced by leaps and bounds, that this company kept its prices at a reasonable level, and that the total increase in our price has been less than 10 per cent. since we began the present model two years ago. This is against the advance of other manufacturers, as you are aware, ranging anywhere from 30 per cent. to possibly 70 per cent. It is a fact, easy of verification, that the advance in materials of all kinds has been a larger percentage than that we have applied to our product. A reduction by a few manufacturers can have no bearing on the general situation. There are some manufacturers who have been charging prices too high and there are also some manufacturers who have had over-production and expansion, both of which were more than conditions warranted—such manufacturers have had to come down to somewhere near the level of others who have not over-priced or over-produced. The policy of this company has been and will continue to be: If at any time the cost of our car decreases we shall put it into the car in added quality where possible, leaving the price as it is, though this much-to-be-desired condition of costs seems to the writer far off. You know we have from time to time made improvements since we began the present model, even when materials were at their highest, though we made no advance in our prices for such improvements and additions. You are assured that there will be no decrease in the price of the current models of Stearns motor cars, and I think that any cut in price by other manufacturers will not affect us in the least, for the good and sufficient reason that our car has been and is honestly priced, and we believe is the most under-priced car built in America, and that like quality cannot be purchased within a range of \$1000 to \$1500 of our prices, and that like efficiency cannot be purchased at any price."

**Stevens-Duryea, Inc.**—No reduction in prices.

**Studebaker Corporation**—"Our plants have operated at capacity all year, and we have unfilled orders for more than 6000 cars. Nevertheless, we believe it highly desirable that lowering of prices be encouraged, and we are anticipating at this time our ability to purchase materials at lower figures during the coming year, to improve labor efficiency, and to increase our present volume of business, all with the effect of lowering the production cost of automobiles. Existing wage rates will be maintained at all plants, which at present are employing 15,000 persons. Our sales are running at the rate of \$100,000,000 a year."—A. R. Erskine, president.

**Stutz Motor Car Co. of America, Inc.**—Prices unchanged and guaranteed. Uncertain of Permanently Good Results.

**Templar Motors Corporation**—"To reduce prices without regard to conditions prevailing, simply because some one else has cut them, would be as uncertain of permanently good results as it is most certainly unwise business and unjust to both workers and stockholders."—Harry W. Anderson, sales manager.

**Vellie Motors Corporation**—Each purchaser of a Vellie car is insured by a bond, issued by the company, against increase between now and July 1 next. A. J. Shorey, president of the New England Vellie Co., states that if the prices of materials do not decline it is his opinion that prices will once more have to advance, and this may be necessary in the next 60 or 90 days. "Vellie prices have always been indicative of a real intrinsic value in automobile construction," continues Mr. Shorey. Never has Vellie been over-priced due to an exceptional demand. Never has Vellie exacted more than a deserved and living profit."

**Westcott Motor Car Co.**—No guaranty on present prices. "Prospects for fall and winter business are very uncertain.

**Willys-Overland Co.**—Accompanying the announcement of substantial reduction in the prices of motor cars, John

N. Willys made the following statement: "We could not possibly have taken this action unless we felt thoroughly justified in anticipating reduced costs of materials, against which conditions our companies have made provision. It has been commented that the automobile business has been profiteering. The profit in proportion to the increase in prices has been much less in this industry than prior to the war. After two months of personal investigation of conditions abroad I am firmly of the opinion that this country cannot hope to develop a healthy business and be able to compete with foreign markets unless we reestablish merchandise selling prices more nearly on a par with the conditions existing prior to the war."

**Winton Co.**—"We have not reduced the price of our cars, nor recently increased them, but we guarantee the present price until the first of March, 1921. It is our idea that money will be easier shortly after election and that trade may have something of its normal character by the first of January."—Charles W. Mears, advertising manager.

#### STERLING TEAM WINS 1920 BASEBALL PENNANT.

The Sterling Tire Baseball team has, for the second consecutive year, won the pennant in the Rubber Industries Athletic League, the standing of the clubs at the end of the season being as follows:

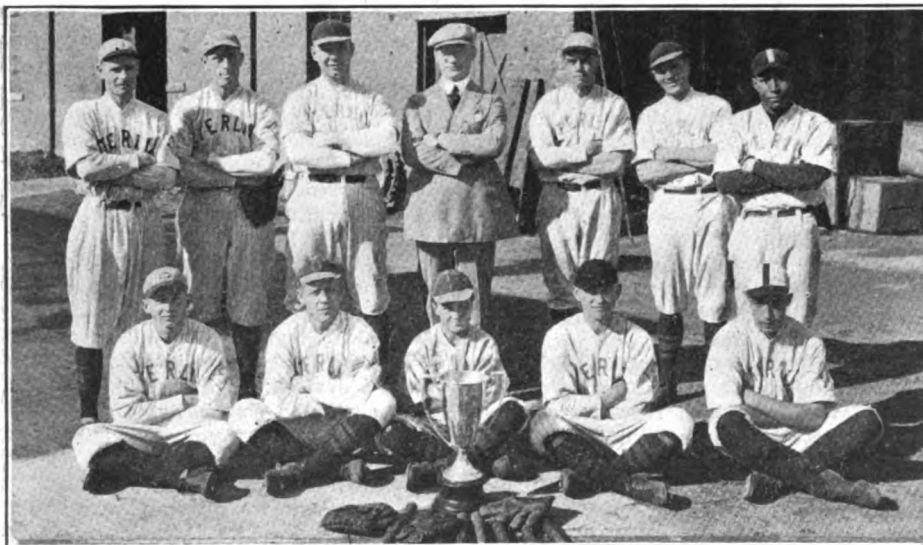
	Won	Lost
Sterling Tire Corporation....	14	2
United States Rubber Co.....	11	4
Ajax Rubber Co.....	6	7
Goodyear Tire & Rubber Co..	2	12
Keystone Tire & Rubber Co..	2	6
Kelly-Springfield Tire Co....	1	3

This second victory is especially unusual since the Sterling Tire Corporation is probably the smallest of the organizations represented in the league. The players for the champions were all recruited from the factory at Rutherford, N. J., and none of them had played much more than the normal "open lot" games, although their pitcher, Harvey Davis, has been showing professional class in winning 34 out of the 40 games during the Rubber Industries Athletic league's two years of existence.

The cup, which is donated by the India Rubber World Publishing Co., must be won three times to become the permanent property of a club. Manager Rourke of the Sterling team announces that his aggregation will be on deck next season to clinch possession of the trophy.

The batting and fielding averages of the winning team were as follows:

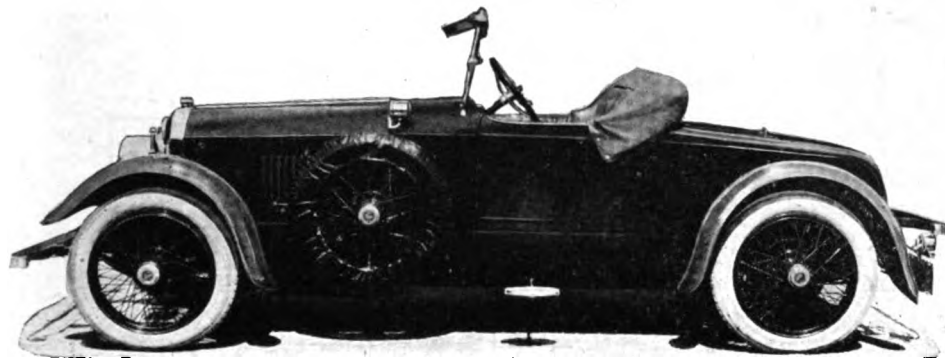
Player & Position	G.	B.A.	F.A.
J. Rourke, 1b.....	14	.413	.955
T. Calandriello, ss..	14	.333	.918
A. Roache, c.....	14	.311	.984
W. Jackson, 1.f....	14	.310	.900
C. Hess, 3b.....	14	.283	.804
P. Ditttrich, c.f....	13	.265	1.000
W. White, r.f.....	14	.237	.818
H. Davis, p.....	13	.205	.967
T. Brameld, 2b.....	13	.205	.921
A. Jackson, o.f....	2	.167	1.000
G. Meany, o.f.....	4	.000	1.000
W. Markowsky, 1.f.	1	.000	1.000



Personnel of Champion Baseball Team of Sterling Tire Corporation—Standing, Left to Right: Brameld, 2b.; Davis, p.; Rourke, 1b.; Captain and Manager, O. Basten, Vice President, Sterling Tire Corporation; Hess, 3b.; Ditttrich, c.f.; Jackson, 1.f. Seated, Left to Right: Marquard, o.f.; White, r.f.; Botto, Mascot; Roach, c.; Calandriello, ss.

## Specially Designed Peerless Roadster

The Van Cortlandt Vehicle Corporation, metropolitan distributor of Peerless motor cars, made by the Peerless Motor Car Co., Cleveland, O., recently



Specially Designed Peerless Roadster Owned by Mrs. Jules Fleischmann, New York City.

delivered a special Peerless roadster to Mrs. Jules Fleischman of New York city. The car is a Peerless 1920 stock chassis on which is mounted a specially designed and built body by Humer Binder Co., 614 West 131st street, New York city. The color scheme is a special blue body with English vermilion running gear and wheels and extra tire covers. It seats four comfortably, even luxuriously, the two rear seats folding out of sight. It is equipped with wire wheels and two extra wire wheels are carried on each side of the car; also with front and rear Selecta bumpers and a specially designed set of six lamps of the Rolls-Royce type, including two cowl lamps. The bracket and cowl moulding are in one piece. The lamp wiring, being through the center of the bracket, is perfectly concealed. The individual side steps are steel forgings, nickel plated. Another innovation is the windshield, which carries a sun shield that can be adjusted at different angles, much as in closed cars. The radiator, lamps, windshield and bumpers are all heavily nickel plated.

It is stated that it would cost at least \$7000 to duplicate this car.

### COMBINATION MOTOR VEIL.

A motor veil has been invented which combines in one article goggles and veil. A shell frame is fitted into the veil, holding in place a piece of pyroxylin sheeting cut to fit the frame. Thus there is no veil over the eyes; no glass to break; nothing to catch in the meshes of the veil and tear. A light amber sheeting may be used for lenses to protect the eyes against sun glare.

### HERSEY MAKES TRADE TOUR.

Dwight T. Hersey, general sales manager of the Jenkins Vulcan Spring Co., Richmond, Ind., has completed a coast-to-coast trip in the interests of his company, arranging with jobbers for specialized service in replacement springs and

getting first-hand information as to the outlook for the coming year.

He reports a firmly established feeling of optimism in trade circles. The consensus of opinion, he finds, is that the recent period of temporary depression has served a purpose—it has made plain the necessity of readjustments, tightening of loose methods, clearing

away of outgrown and outworn policies; and it has afforded time and opportunity for these improvements. Mr. Hersey states that he finds the automotive industry "with its belt tightened and its sleeves rolled up, stripped of surplus fat, and ready for bigger business than ever."

### AMERICAN ADJUSTING ASSOCIATION'S BOSTON OFFICE.

The American Adjusting association has opened another of its chain of offices in the Old South building, Boston, this step being toward the consummation of its plans to have headquarters in every large city in the United States. The American Adjusting association has been in the collection business for 27 years and is a specialist in this line of national reputation. The manager of the Boston office will be Arthur T. Hughes, who has the indorsement of leading business men and an extensive experience from his association with mercantile and other agencies.

The Boston office will specialize in the collection of automobile and commercial accounts in general.

The Holly Carburetor Co., Detroit, is now occupying its new addition.

## King Co. to Move into New Plant

Following the announcement of the disposal by the King Motor Car Co. of its present main plant site at Detroit, Mich., to the United States Tire & Rubber Co., comes the report to the effect that the King company will on Dec. 1 move to a new, modern plant in that city which will afford amplified production capacity as well as better manufacturing facilities. The King Co. has occupied its present site for eight years, but as it was located between two buildings owned by the tire company, it offered no chance for the necessary expansion of the automobile company.

The new plant of the King Motor Car Co. is situated in the heart of the motor car manufacturing industry, where the plants of the Packard, Hupmobile and Dodge Brothers are located, where labor and production facilities are ideal. It has a frontage of 215 feet and depth of 240, giving over 10,000 more feet of floor space than the combined area of the three plants now occupied.

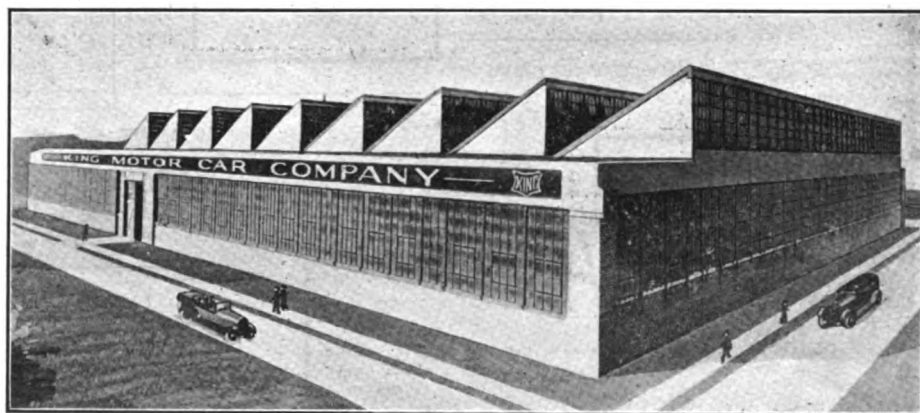
The new building is of brick and fenestra sash construction with steel I beams, Egyptian roof and cement floor. It is located at Conant avenue and the Grand Trunk railroad.

Up to a few weeks ago the King company was planning for its expansion by the erection of a new plant on a 15-acre site in West Detroit, acquired early this spring, but this deal, just consummated, will afford an opportunity for preparations for immediate augmentation of manufacturing facilities, as it is reported that the recent reduction in the price of the King car has stimulated the demand.

### NEW PLANT FOR H. & D. CO.

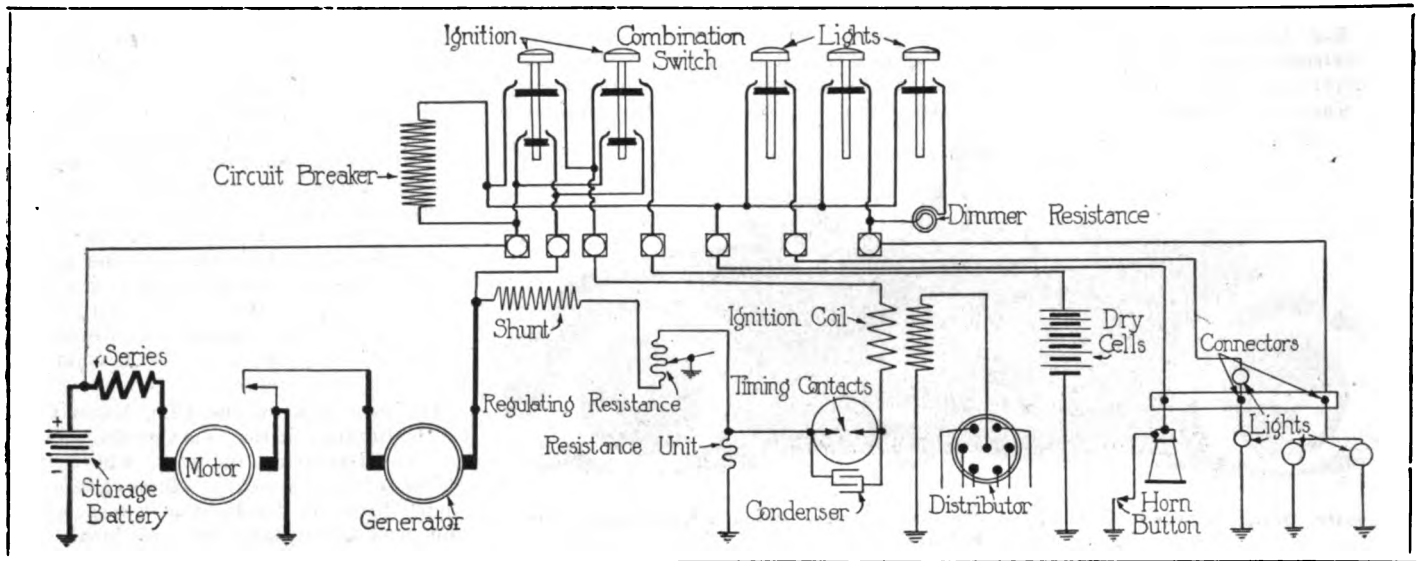
The H. & D. Co., Crawfordsville, Ind., manufacturer of the H. & D. Shock Absorber, recently completed a new factory unit in that city, 60 by 200 feet, equipped with the latest machinery and supplied with every modern appointment and convenience for the economical production of shock absorbers and other automotive equipment.

The H. & D. Co. was formerly located at Goodland, Ind.

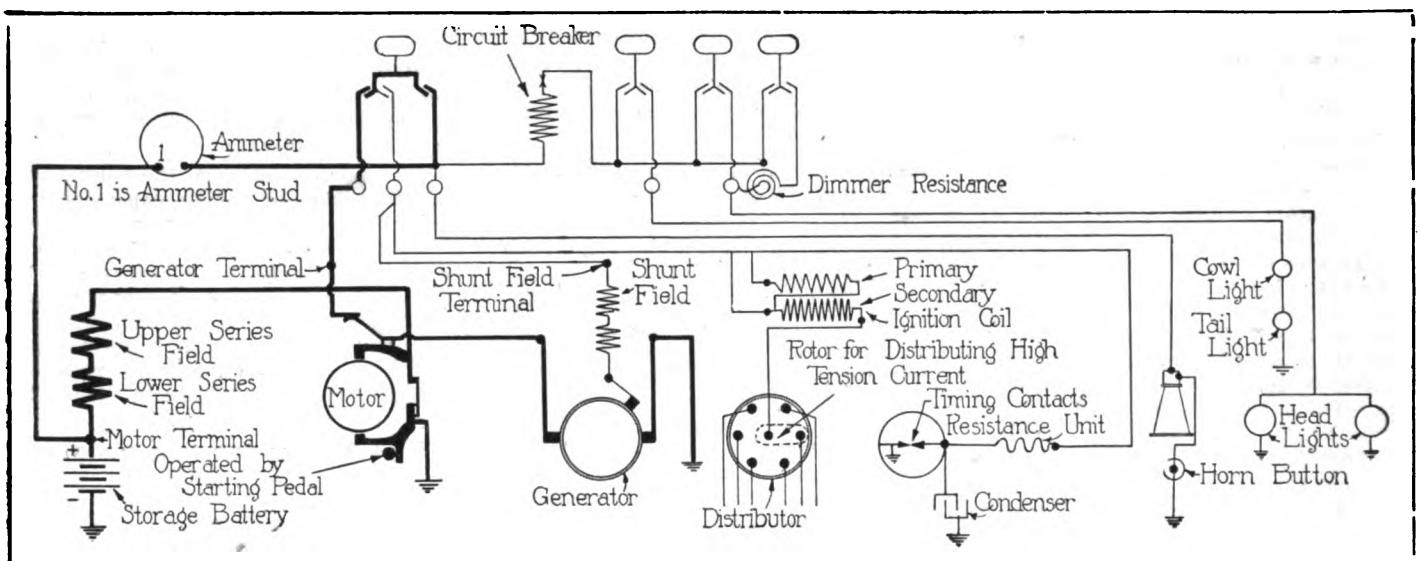


New Plant of King Motor Car Co. at Detroit, Mich.

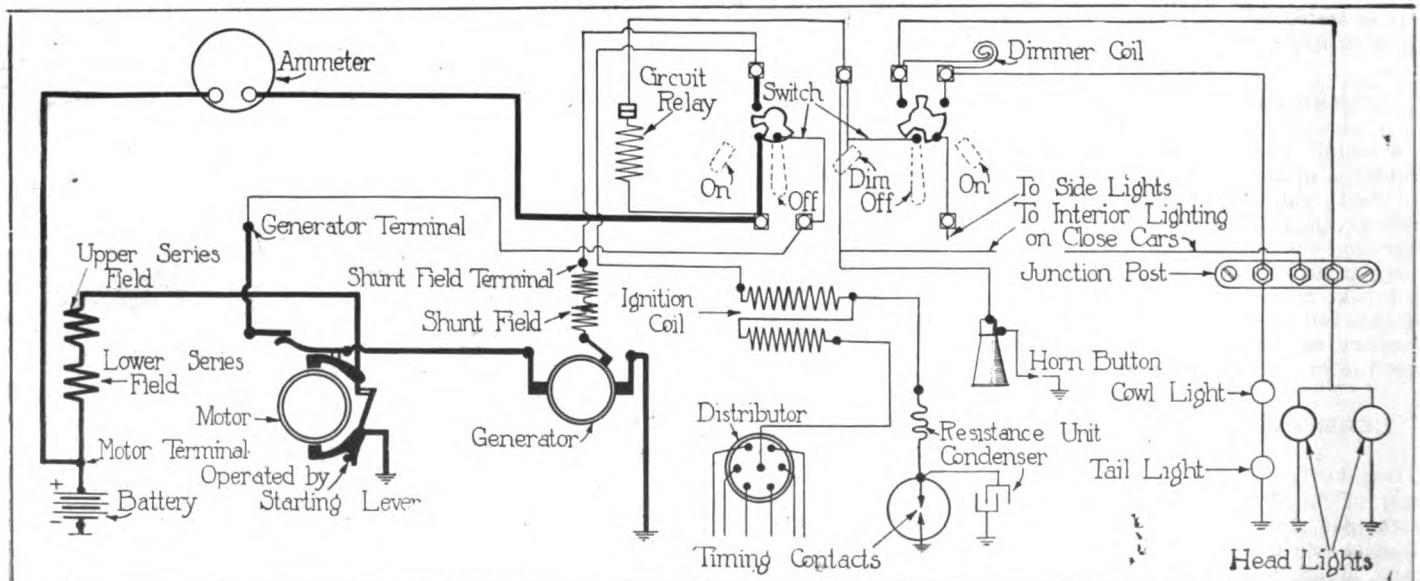
# Monthly Wiring Diagram, No. 8



Hudson 6-40, 1914-15-16.



Hudson Super-Six, 1917-18.



Hudson Super-Six, 1919-20.



# HUMOROUS SIDE OF MOTORING

## IT'S DIFFERENT IN THE GOOD OLD U. S.

In Switzerland motor cars are not allowed to run during daylight hours on Sunday from May 1 to Sept. 30. This regulation is intended to enable people who do not own automobiles to take their holiday excursions without being annoyed by dust.

## USED TO BE BUGGY RIDING.

According to a recent ruling by the Ohio secretary of state motor driven hearses, pallbearers' conveyances and privately owned ambulances are licensed as "pleasure" cars. Not so many years ago buggy riding was considered as the acme of enjoyment in the Middle West.

## WELL QUALIFIED FOR DRIVER'S LICENSE.

The New York Evening Mail vouches for the following bona fide answers to questions given by ladies during an examination for an automobile driver's license:

If your engine stalls going up hill what do you do? Try and start it.

In letting the car stand, which side should be next to the curbing? The side that is nearest the sidewalk.

What should you do if the steering gear broke? Go to the nearest garage and have the man fix it.

Which has the right of way, a car on a main thoroughfare or a car on a bisecting street, when they approach? The one that gets there first.

What is the proper precaution to take when backing your car? Reverse your engine.

What is the accelerator? The name of something that has something to do with something inside of the car.

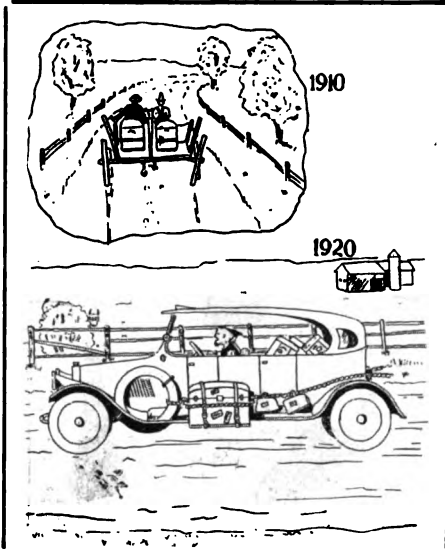
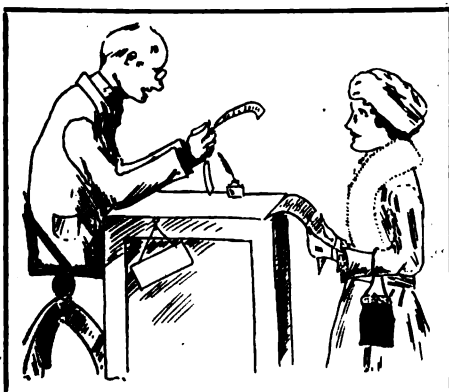
What is the charging indicator? Your bill for garage, gas and oil.

What is the first rule of the road? Don't run into anything.

Where should you have your license number? On your car.

What is meant by "short circuit?" Going around the shortest way.

When the batteries run out, what must you do? Get them back or get new ones.



## A DECADE OF PROGRESS.

Summer boarders this year were surprised at being met at the station by the bucolic host in his elegant new touring car, instead of the springless conveyance of a decade ago, until they were confronted by the farmer's new schedule of prices.

## SOMEWHAT PREMATURE.

Lyman Wolcott at Sayre, Pa., was driving a car without lights. An officer took the number of his license, and recorded the hour 7:30, and Halcott paid \$3 fine. When he got home he consulted an almanac and found that the time of sunset that day was 7:34. He got the \$3 back.

## FOR THE INNOCENT BY-STANDER.

"Who was it that wrote the line: 'A little learning is a dangerous thing?'" asked the Old Fogey.

"Must have been some man who was trying to run an automobile for the first time," replied the Grouch.—Cincinnati Enquirer.

## MUST USE A "CHAR.A.BANC."

John A. Manzet of Atlanta, a cotton planter, is touring western states from Yellowstone to Niagara, by automobile, accompanied by 20 of his young nieces and nephews. He says he gives his little relatives a trip every year to a different part of the United States or Canada.

## MOTHER'S VACATION.

"Is your wife's mother enjoying her trip to the mountains?"

"I'm afraid not. She's found something at last that she can't walk over."—Boston Transcript.

## RUDELY AWAKENED.

N. F. Andrews of San Francisco, driving an automobile in the early morning hours, fell asleep. The car rambled right along all right for two miles, from the last landmark Andrews saw, and then at a turn in the road smashed into a fire hydrant.

## AN AWFUL ALTERNATIVE.

"My dear," said Mr. Percival Pinochle.

"Yes, lovely," said Perc.

"Shall we drive over and get five gallons of gasoline, or will you walk to town and buy a four-pound roast?"—Richmond Times-Dispatch.

## NO CHANCE FOR ARGUMENT.

A tourist reports seeing the following police regulation posted up in Ireland:

"Until further notice every vehicle must carry a light when darkness begins. Darkness begins when the lights are lit."—Boston Transcript.

## WELL EQUIPPED.

A seven-passenger touring car by a doctor with wire wheels and one-man top.—Advertisement.

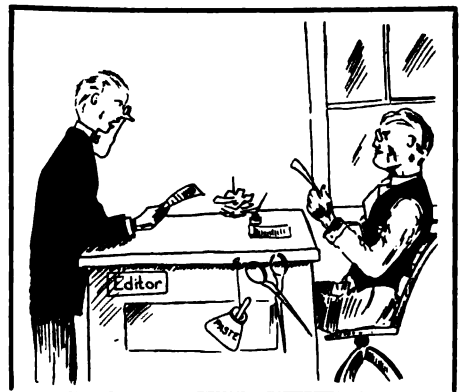
## VERY VERS LIBRE.

"How's that for a poem?" the imagist asked as he handed a sheet to the editor:

Celery  
Spaghetti  
Onions and salt  
Crackers  
Hominy  
Swiss cheese  
One Dozen clothespins  
Motor veil  
Order taxi at nine

"Great," said the editor as he finished reading it aloud; "one of the cleverest things even you have ever done."

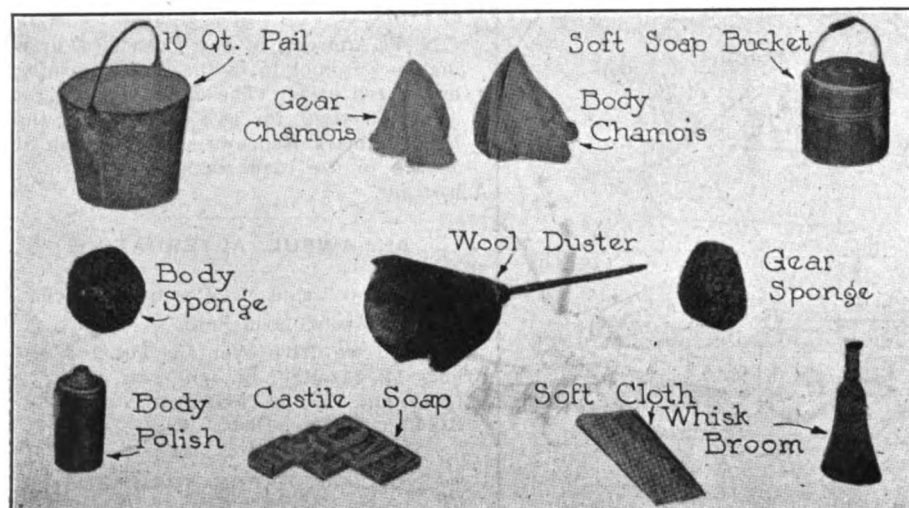
"Good gracious!" said the poet; "I gave you the wrong slip. That's my wife's shopping list."



## Hints on Proper Cleaning of Motor Car

**M**OTORISTS as a rule spend considerable money yearly in keeping their automobiles clean and shining. This is an expense which can be considerably reduced if the owner does

move it. If the car has been standing some days and the mud has dried on it is well to pour water copiously over all the parts to be cleaned before touching them with the sponge.



A Great Deal Depends on Proper and Adequate Equipment in Washing the Car.

this work himself, as it is a job that can be done by an inexperienced man provided he goes about it in the proper manner. It is essential to have a good carriage sponge, care being taken to see that it is free from coral or other mineral substance which would have a tendency to scratch and injure the finish, a chamois leather and a bucket. It is of course desirable to have access to a hose and running water and an equipment of large rubber boots with extensions up to the thighs and a spoke brush are very convenient, but the last three can be dispensed with if necessary. Some motorists use a simple garden watering can or force pump as a substitute for the hose, but it is not nearly as effective.

### Points to Be Observed.

When a beginner commences to wash a car he is under the impression usually that the job is an easy one, but at the finish he is generally dissatisfied at the result. There are two important points to bear in mind: One is to use plenty of water when removing the mud, and the second is never to allow the water to dry off naturally on the body work. It is not always necessary to make a very thorough wash. In the case of those who wash their cars daily it is often the custom to clean merely the most conspicuous parts such as the bonnet, body panels and the tops of the mud guards, leaving the wheels and the underneath parts for a periodic clean up, which can, if necessary, be done at some garage.

When washing the car the mud must be thoroughly moistened before any attempt is made to remove it. It is very important to emphasize this, because if one is not using a hose there will be a tendency to stint the use of the water and the varnish may be spoiled in consequence. If, therefore, the mud is caked on thickly, it must be thoroughly saturated before an attempt is made to re-

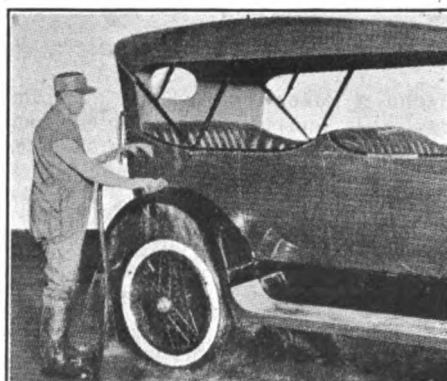
### A Complete Wash.

In the case of a complete wash the work should first be started on the lower parts, that is to say, the mudguards and the wheels, and here it will be found that the hose will be most useful. The reason for starting on these parts first is that if left till the last mud will be splashed up over the more conspicuous panels which have already been cleaned. Obviously in washing the mudguards one should start at the highest points and if the job can be done immediately after the car comes in from a run it will be easier than to leave it until the mud is caked on.

Some drivers scrape the underside of the mudguards, causing the mud to fall off dry.

This is, of course, very quick and effective when the use of water follows, but obviously it damages the paint on the underside of the guards, which may or may not be of importance to the owner; in any event it will have a tendency to allow rust to accumulate and will eventually damage the guards seriously.

It must be remembered that near the



Proper Method of Washing Car, Using Hose and Sponge.

wheels there are important bearings which it is very desirable to be kept dry. This applies not only to the wheel bearings, but also to those of the brake mechanism and also to the spring leaves. If a powerful jet of water be directed all around the hubs and axles some moisture is bound to be driven into these bearings or between the leaves of the springs, and rust will be caused, which may result in the binding and rapid wear of the bearings. An excess of water is therefore to be avoided on parts such as those mentioned.

To clean the wheels thoroughly each one should be jacked up and the spokes cleaned in turn. In the case of wood wheels, if the spokes are a bevel fit where they enter the hub, water must be prevented from drying in the cracks. Of course there should be no cracks or spaces between the ends of the spokes, but these are sometimes to be found, and if water gets in it will in time rot the wood.

### Washing the Body.

When giving the car a thorough wash, therefore, the muddiest parts should be cleaned first. Then it is usual to start washing the body at the highest point, which is the cowl dash or windshield. The panels should be well moistened either with a low pressure from a hose or by pouring on a can of water. Then with the sponge saturated with clean water, the washing should be done from the top downwards. Where the mud is thick, plenty of water must be used. In this way one works along the cowl and the hood or bonnet to the radiator; then the tops of the front mudguards are cleaned in the same manner, the side aprons of these, the sides of the hood cover, and so along the sides of the car towards the back, sponging always downward, and rinsing out the sponge after every stroke. If a hose be used it should be held in the left hand and the sponge in the right and with a gentle stream of water the two worked together. When all the mud is removed it is well to give a second good quick rinse over with the hose and a clean sponge and then comes the drying.

The chamois leather must be saturated in clean water and then rinsed out so that it is left quite moist and pliable. Starting at the highest point and going over the same tracks as with the sponge all the moisture on the panels is dried off. From time to time the chamois must be wrung dry and if it becomes dirty it must be rinsed out in clean water. If the engine be hot the hood will dry in the ordinary way before it can be chamoied. Therefore it should be chamoied directly after it has been sponged over and before washing the rest of the body. But it is better to let the engine cool before washing the hood, leaving this part of the work till the last if operations be commenced directly after coming in from a run.

For a partial clean up the same process must be followed, omitting the wheels and the under sides of the guards.

For cleaning the windshield, either a wet chamolais should be used or a sponge, or both if there is mud on the surface to be cleaned, and then before the glass is dry it may be rubbed over with a ball of newspaper. This gives it a fine polish. The few specks of paper dust on the glass can subsequently be removed with a dry duster.

Soap should not be used in the ordinary way in cleaning body work, but it is a good policy, say once every six months, to give the car a thorough clean up, finishing off with soapy water. Some drivers put kerosene in the water when cleaning the axles and wheels with a spoke brush. This is not advisable in general practise, but sometimes it is the only way of removing greasy mud. One should be careful, by the way, never to get any oil or grease on the chamolais leather used for drying off the body panels. This applies also to the sponge, and it is the best policy to be provided with two sponges, one to be used on the gear and wheels, where there is more or less grease and oil, and one for the body panels, keeping the latter clean.

One will find, when cleaning the car, that the spare wheel, if very much exposed, calls for almost as much attention as the wheels actually in use. Much trouble and labor will be saved if a covering be used on the spare wheel, for it not only saves cleaning, but protects the tire from damage by moisture and sun.

Where there is much brass work to be polished it is more satisfactory to enamel this black to match the guards and hood of the car. This will save many hours of labor in polishing and is considered by many to add to the appearance of the car. Parts subject to heat should be painted with a grade of paint that is guaranteed by the manufacturer to stand without peeling, while the other parts can be enameled.

When washing the car it must be remembered that the hose must not be turned on the front of the radiator, as the water will be splashed through on to the generator, magneto and spark plugs. In some cars it will also splash upwards when directed under the frame, and so on to the engine. A temporary waterproof shield may be fitted behind the radiator, extending over the top of the engine and down the sides to prevent the water from short-circuiting the plugs and other electrical units of the engine.

#### CARBON AND LUBRICATION.

An oil which is stated to be "free from carbon" or one that is claimed not to deposit carbon in the engine combustion chambers is not necessarily a good lubricant. There are many instances where oils which deposit a very small amount of carbon possess insufficient heat resisting qualities to meet the conditions required in an automobile engine. Therefore, do not let the above phrases be your guide in purchasing engine oil. Lubrication is the main point and this means oil of good body, high fire test and that remains viscous when heated to the working temperatures existing inside a gasoline engine.

## Points on the Testing and Causes of Trouble in Engine Compression.

MANY motorists are not aware what the trouble is when their engine suddenly develops sluggish action on the road. The engine has been apparently giving its rated power while driving on level ground, but as soon as a grade is encountered the power seems to be lacking; it fires steadily on all cylinders, does not miss explosions when tested by means of the spark plugs or, if equipped with test cocks, when the cocks are opened, allowing a small amount of the burning gas to pass out. A finger held fairly close to the top of the cock during the day time will show plainly whether the cylinders are firing steadily or not, changing the finger from cock to cock as the engine is running. If the day is cloudy or it is near dusk, a flame can readily be seen issuing from the top of the cock, indicating that the cylinder is firing correctly. If the flame is of a deep bluish color the indication is a perfect mixture, but if the color is yellowish the mixture is weak and should be corrected at the carburetor adjustments.

After the above tests have determined that the ignition and carburetor are not at fault the next course to follow is to try the compression of the engine by closing the petcocks and using the starting handle. With the ignition turned to "Off" position, turn the engine slowly, rocking the shaft slightly with the handle, bringing the piston up against the compression of the cylinder. Test each cylinder in turn, noting which cylinders are weaker. If the engine is equipped with petcocks, leave all of the cocks open except that on the cylinder being tested; try the compression of this cylinder with the starting crank, close the cock and try the next and so on till all are tested.

On engines not equipped with cocks, and many cars today do not have them, other methods will have to be employed. Remove the cover which protects the valve mechanism at the side of the engine and as the engine is turned note, by the position of the valves, which cylinder is on compression. This will be the one in which both valves are closed at the same time.

Remember that the engine upon which you are carrying out tests is four cycle; that is, that two revolutions are taken by the connecting rod piston to complete a cycle. For instance, the first downward stroke takes in the charge of new gas, the piston compressing the charge and the spark from the spark plug firing the compressed charge as the piston reaches the top and passes over on the downward stroke. After the charge has been fired by the plug the following downward stroke is known as the power stroke till the piston reaches the end of its stroke.

The next stroke upwards of the piston forces the burned gas from the combustion chamber out through the exhaust valve, which has opened in the meantime, clearing the combustion chamber and allowing it to pass into the exhaust

pipe and on into the muffler.

If certain cylinders are found weak, the next step is to locate the leaks if they are on the outside and are caused by loosely fitted fittings, such as spark plugs, valve caps or a leaky gasket between the head of the cylinders and the cylinders. To test for leaks of this nature, start the engine and while it is running, squirt oil from an oil cup around the edges of the caps and plugs, also around the side of the head where the gasket is fitted; that is, the point where the separation occurs between the engine head and the cylinders. Leaks will be shown by bubbles caused by the compression forcing its way up and through the oil. Leaks of this type can usually be remedied by tightening while the engine is warm the parts affected.

If, on the other hand, bubbles do not show, indicating that these parts are tight, one can be very sure that the defect is inside of the engine and that either the valves should be ground, that there are scores in the walls of the cylinders or that the rings have worked around so they align and allow a portion of the mixture to pass by the rings and into the base. Scores in the cylinder walls or the rings aligning their openings will also allow oil from the base to work by in greater quantities than needed with the result that carbon will accumulate rapidly in the head of the cylinder and on the piston, fouling the spark plug and causing the engine to operate irregularly.

Loss of compression due to weak valves will be indicated, if it is an inlet valve, by a popping sound in the carburetor when the car is pulling on a grade or, if an exhaust valve, in the muffler when the car is coasting or pulling on a grade.

Defects of this nature, due to scores, aligning of the rings, or weak valves, should be attended to at the earliest opportunity to get the utmost pleasure from motoring, and the motorist who remedies them in time will take the most comfort when driving.

#### ADJUSTMENT OF THE CARBURETOR.

Tinkering with the carburetor often causes most disastrous results. Not only will it often result in excessive carbon deposit, waste of gasoline and power, but may cause the engine to misfire and lose speed. Unless the operator has had considerable experience he will do well to leave the carburetor severely alone.

#### HOOD SHOULD GET CARE.

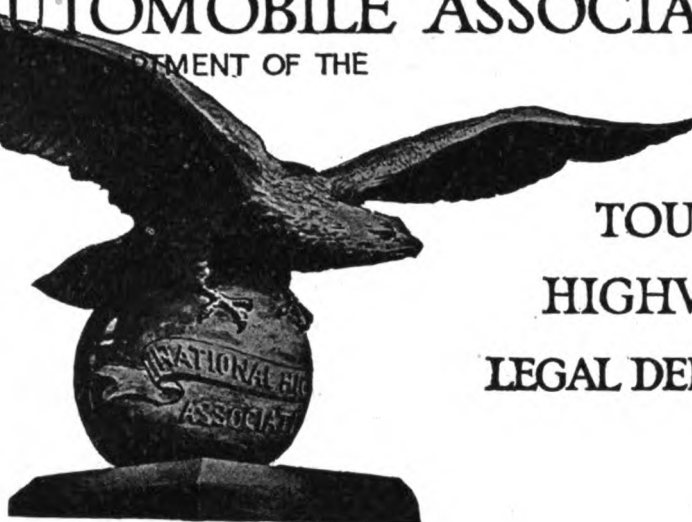
Because of the extremes of temperature to which it is subjected, the finish of the hood of a car dulls quickly; hence it is well to wipe off the hood carefully after a run in a rain because moisture dries rapidly on the bonnet and usually spots it, ruining the fine finish in time.

# OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL  
HIGHWAYS  
ASSOCIATION

TOURING  
HIGHWAY  
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

## Important Announcement of National Automobile Association

THE directors of the National Automobile Association have decided that the AUTOMOBILE JOURNAL is the best adapted to the needs of its members, therefore, hereafter members of the National Automobile Association will receive absolutely free one year's subscription to the AUTOMOBILE JOURNAL and the official news of the National Automobile Association will, hereafter, appear in these columns. Readers of the Journal should, therefore, note that they can get this publication free by becoming a member of the National Automobile Association and in addition thereto, they can save many times the membership fee.

The National Automobile Association is offering to members who join prior to Jan. 1, 1921, the following benefits for one year for the sum of \$5:

1. The Official Blue Book for 1920, price ..... \$3.00
2. 12 months' subscription to Automobile Journal, price..... 1.50
3. Services of expert attorneys not only to car owner, but to immediate members of his family. Minimum value..... 25.00
4. Discount on tires, tubes and other automobile accessories. Minimum value..... 10.00
5. Handsome insignia plate. Minimum value..... .75

Total.....\$40.25

The official Blue Book needs no introduction. It is considered as the standard road book of America. Volume two gives the most complete and comprehensive touring information of New England and the maritime provinces of Canada. Next year this book will cost \$4 anywhere on the market. In addition to receiving volume two of the Blue Book any member is entitled to call on the National Automobile Association for a tour-

ing route to any point in the United States.

Due to its valuable connection with the National Highway Association and the Blue Book Publishing Co., the National Automobile Association has one of the most complete and efficient touring departments of any organization of its kind.

The National Automobile Association has engaged as its general counsel the firm of Radley, Merrick & McCleary, which has associated with it other counsel in all parts of New England to advise its members on all their automobile troubles, to defend them in all their complaints for violations of automobile laws and in all suits brought against them for property damage. All this service by attorneys who are experts in this particular field costs members absolutely nothing and may easily be worth anywhere from \$25 to \$100. Its attorneys are working constantly for a fair and equitable administration of the automobile laws,

for the enactment of just and safe automobile legislation and for good roads everywhere.

The National Automobile Association also states that it can save its members more than their annual fee by discounts which it can obtain on automobile accessories.

When you join the National Automobile Association you receive, in addition to all the foregoing services, a membership in the National Highways Association with its accompanying certificate and membership button. This great association, composed of more than four-score representative organizations, is working constantly for national highways and good roads everywhere.

### Two Classes of Membership.

Beginning with Jan. 1, 1921, there will be two classes of membership in the National Automobile Association. One for \$5 per annum, without a Blue Book, and one for \$7 per annum with a Blue Book. This is made necessary because of the

### APPLICATION BLANK

BLUE  
BOOK

### NATIONAL AUTOMOBILE ASSOCIATION

New England Department

### NATIONAL HIGHWAYS ASSOCIATION

9 PARK STREET, BOSTON, MASS.

The undersigned hereby applies for membership in the National Automobile Association, New England Department of the National Highways Association.

Enclosed herewith you will find check for \$5.00.

If you wish the Blue Book sent to your address, add 15 cents to the Membership Fee for packing, insurance and postage.

Name..... Telephone.....

Address..... City..... State.....

Make of Car.....

Checks MUST be made payable to the National Automobile Association.



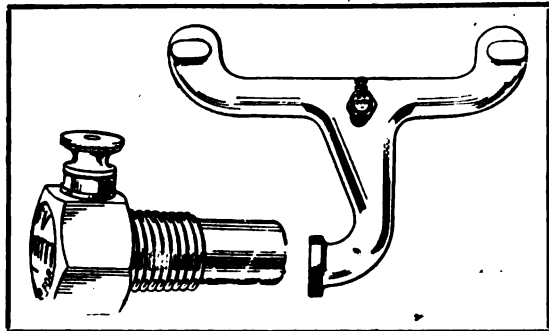
increased cost of the Blue Book. The National Automobile Association officials hope next year, if orders are given in time, to be in a position to give with a \$7 membership any one of the 13 volumes of the Blue Book covering any part of the United States desired.

However, anyone joining prior to Jan. 1, 1921, can have a 1920 volume two Blue Book free with a \$5 membership. The 1921 Blue Books will not be out until next spring, but unless one is very particular about the very latest roads a Blue Book can be used for two or three years without change.

Anyone wishing to join the National Automobile Association for a \$5 1920 Blue Book membership, will please make out the following application blank and forward the same with check to the National Automobile Association, 9 Park street, Boston, Mass.

#### STARTIT MANIFOLD HEATER AND VAPORIZER.

Considerable interest has been aroused in automobile circles by the invention, production and placing on the market by



the Startit Manufacturing Co., Indianapolis, Ind., of its new device for electrically vaporizing the gasoline fuel to make starting easy.

Many motorists, as cold weather approaches, experience considerable annoyance occasioned by the difficulty and delay in starting the motor. It is claimed that this may be eliminated by the installation of the Startit manifold electric heater. Heat vaporizes gasoline and Startit provides the heat. It uses only four amperes and is stated to get hot enough to vaporize gasoline in 12 seconds. It is operated by a switch on the instrument board connected with a storage battery of four dry cells.

Among the advantages claimed for it are that it is simple in construction, compact and requires no extra large fittings, and does not occupy excessive space; it is complete in every detail; anyone can install it and it needs no adjustment, no attention, never gets out of order and will last the lifetime of the car; finally it is absolutely guaranteed to give satisfaction or money will be refunded.

It is, however, not claimed to be a cure for all automobile troubles, but is designed for the single purpose of making the car start more easily at any and all times, especially in extreme cold weather.

The price, \$3.50 net, is moderate

enough to be within the means of any automobile owner and is stated to be well worth twice its cost.

#### TO AID DEALERS AND GARAGES.

To aid dealers and garages in the sale of Peerless automobile specialties, the manufacturer, the Columbus Varnish Co., Columbus, O., has added two new products, which will be introduced at the coming automobile shows. The company has also made changes in its window display material, so as to make this feature more effective.

Beginning Nov. 1 the H. H. Franklin Manufacturing Co., Syracuse, N. Y., will increase its production of motor cars to 30 a day.

#### Personal Mention

L. E. Carpenter, formerly branch manager for the Goodyear Tire & Rubber Co. at El Paso, Tex., has been appointed assistant manager of the northwest district, with headquarters at Portland, Ore. Mr. Carpenter has been with the Goodyear Co. for eight years, first as office manager and a member of the sales force in Detroit, later in the dealers' sales department in Akron, and after that as a special representative of the export department in Porto Rico. In 1918 he was assigned to Denver, Col., as special pneumatic truck tire representative, and on April 1, 1919, was appointed branch manager at El Paso. W. H. Vining, zone manager, succeeds Mr. Carpenter at El Paso.

Bert A. Doyle, who has been for a number of years in charge of the Woonsocket, R. I., branch of Dutree W. Flint, Southern New England distributor for the Ford, has resigned and has taken over the Dodge agency in that city, opening handsome sales rooms in a new brick building at the corner of East School and Pond streets. The structure provides 5000 square feet of floor space.

L. A. DeBlois, manager of the safety section of the E. I. du Pont de Nemours & Co., Wilmington, Del., and W. E. Worth, assistant manager of the industrial relations department of the International Harvester Co., Chicago, Ill., were elected vice presidents at the recent Ninth Annual Safety Congress held in Milwaukee, Wis., Sept. 27-Oct. 1.

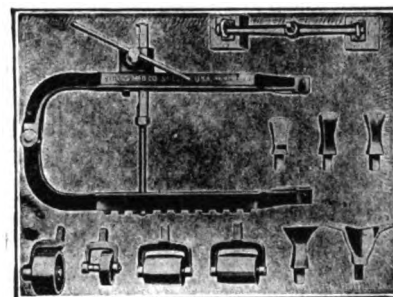
James Newton Gunn, vice president of the United States Rubber Co. and president and general manager of the United States Tire Co., made an address before the rubber section of the National Safety Council at the recent Ninth Annual Safety Congress at Milwaukee, Wis.

Paul A. Stevenson, manager of the Dallas Oakland Co., has been appointed by John Neal, president of the North Texas Oakland Co., as manager also of the North Texas Co. to succeed W. A. Riley, who resigned to go to El Paso, Tex.

## Roll-Em-Out Fender Straightener

The Stiles Manufacturing Co., St. Louis, Mo., offers in the Stiles Rolls-Em-Out Fender Straightener a unique tool by the use of which is opened up a new source of profit for the garage, repair shop and service station by the quick repairing of bent or damaged automobile fenders and similar components. Moreover, it is claimed that the work can be done without removing the fender from the car and without marring the enamel or finish; that the old, laborious process of hand peening and bumping is entirely done away with and that the metal is distributed uniformly and the fender reshaped and smoothed quickly and perfectly.

The device consists of an adjustable yoke constructed from two malleable iron arms, hinged and slotted, as shown in the accompanying illustration, and through which the tension adjustment bar passes. By means of the tension bar the distance or spread between the arms is controlled and operated on the principle of an arbor press. To the free ends of the arms are fastened, by



means of set screws, suitably formed rollers and attachments, the outfit including a variety of shapes and sizes of rollers and attachments, each exactly suited to a given purpose.

#### Its Operation.

In operation the straddle block arm attachment is so placed over the fender that the concave side of the dent is on the same side as the straddle block. The proper roller attachment is placed on the other arm and as the tension bar is tightened gradually, the roller is pushed back and forth across the bent place and the dent is forced up. This ironing out process is conducted first with one roller and then another until the fender is restored to its original shape. The operation is simple and with a little practise and study of the various combinations of attachments, guided by the illustrated instruction sheet supplied with each outfit, any repair man can readily become an expert in its use.

The list price of the complete outfit is \$40.

#### SHIPMENT OF CLEVELAND CARS.

Shipment of cars by Cleveland Automobile Co. passed 15,000 mark for year Oct. 15. Company has been operating with full force for less than six months.

# FORD STARTING AND LIGHTING SYSTEM

(Continued from September Issue.)

The necessary tools and equipment for testing and making minor repairs and adjustments on the generator consist of the following:

One six-volt battery, one vise, one ammeter, one Yankee screw driver, one  $\frac{1}{4}$ -inch screw driver, one fiber drift, made from an eight-inch piece of  $\frac{1}{2}$ -inch fiber bar tapered to  $\frac{1}{8}$  inch (taper starting about three inches back); one brush spring hook, one rawhide mallet, one machinist's hammer, one special wrench, Ford No. 3Z-000; one combination knife and saw made from a hack saw blade, one test lamp, one gear puller (this may be purchased of the Hinkley-Myers Co., Jackson, Mich.).

## Convenient Repair Bench.

A convenient repair bench is shown in Figure 5. One terminal of a six-volt battery is connected through an ammeter (one reading from 0 to 20 amperes), by means of a wire, to a bolt on the vise. Another wire is led from the opposite terminal of the battery and is used as the movable wire in testing the generator. Immediately to the right of the vise, protruding through two holes in the bench, are two terminal wires of test lamp. The current in this circuit is 110 volts. The lamp is installed under the bench and the light shows through the bull's eye at the extreme right of the cut. At the rear of the bench, immediately behind the vise, is shown the nozzle of an air hose, which may be pulled up through the hole in the table when required. A weight on the hose pulls it back to the position shown when not in use. The test lamp may be made from an ordinary socket as seen at Figure 6.

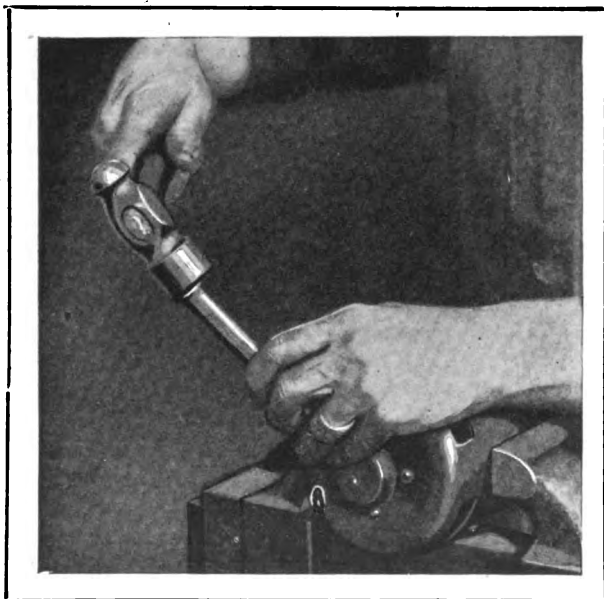


Figure 7. Removing Dust Cover, Brush End of Generator.

Usually the only trouble found in the generator is that the commutator is dirty or that the brushes have become worn or have shifted from their proper positions. The generator should be placed in a vise, as shown in Figure 7, and clamped with a slight pressure to prevent its falling out. It is well for the repairer to acquire the

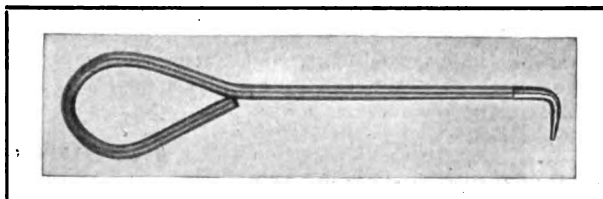


Figure 8. Easily Made Hook for Removing Brushes.

habit of clamping the generator each time it is moved, to insure against its dropping out. Remember also that a powerful pressure may be exerted by a vise and, if too much is put on the generator, the yoke may be sprung out of shape, causing the pole pieces to rub against the laminations of the armature.

## Cleaning the Generator.

The first operation in cleaning the generator is to remove the dust cover, which fits over the opening in the brush end bracket. On the first generators this was secured by means of two screws, one at the terminal post and the other diagonally opposite. Later these dust covers were fitted with only one screw in the terminal post, thus permitting their removal while the generator was attached to the engine. After these screws have been run out the dust cover may be driven off by placing a screw driver at the edge and tapping with the hand or a hammer. Next try the armature to see that it will turn freely. If it binds the repairer may know that the trouble is either in the bearings or caused by the armature binding some part of the field coils. If it turns freely, attach the wire from the battery to the terminal posts and the generator should run as a motor. If the motor does not turn the trouble probably is in a dirty commutator, or poor or improperly set brushes. While the generator is running as a motor, hold a piece of sandpaper against the commutator with the finger and move it back and forth until a bright surface is attained. Never employ emery paper, as emery is a conductor and its use will invariably result in short-circuiting the commutator. If the ammeter shows a discharge of less than six amperes, the generator is probably in good condition. However, it is advisable to remove and examine the brushes before replacing the generator on the engine.

The brushes are removed by pulling the

## FITTING NEW GENERATOR BRUSHES.

spring back by means of the hook shown in Figure 8. This hook can be made by the repairer from a piece of 1/16-inch, or 3/32-inch wire. Some repair men make them by straightening the end of a button hook. However, the one shown in the cut permits the operator to hang it on his little finger when not in use, and, as it is needed often throughout the work on the generator, it will be found a good habit to carry it in this way. When the spring has been drawn back the brush may be pulled out of the holder by means of the pig tail.

Examine the brush to see that it has a good bearing on the commutator. As the brush is black and the deposit from the commutator shows copper colored, this is an easy matter.

The brush should have a 75 per cent. bearing, which should extend clear across the face of the commutator. See that none of the wires in the

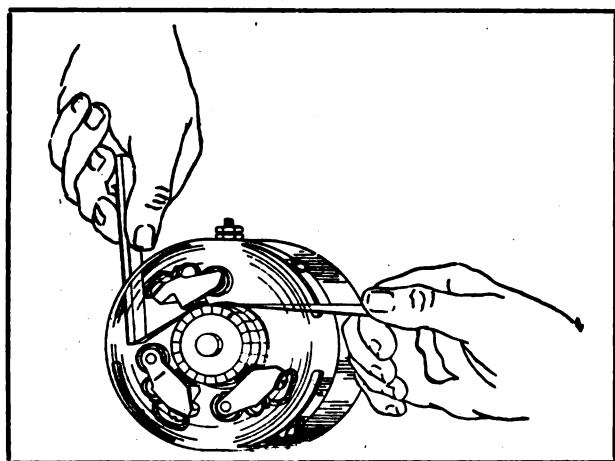


Figure 9, Incorrect Method of Sanding Brushes—Corners of Brush Rounded Too Much.

pig tail are broken and that it is properly secured in the brush. A loose connection in this brush, as at any other point, causes a loss of current and excessive heating at that point. Replace the brush and spring. To see that the spring is bearing properly on the brush, raise the brush 1/16 to 1/8 inch by means of the pig tail and then let go. The brush should drop back on to the commutator with a sharp click.

#### New Brushes Should Be Fitted.

If it is necessary to replace one of the brushes, the new one should be sanded in by wrapping a piece of sandpaper around the commutator with the abrasive toward the brush; then, by rocking the commutator together with the sandpaper back and forth, the brush is cut to the approximate radius of the commutator. It is very important that the sandpaper conform to the commutator. Figures 9 to 12, inclusive, show

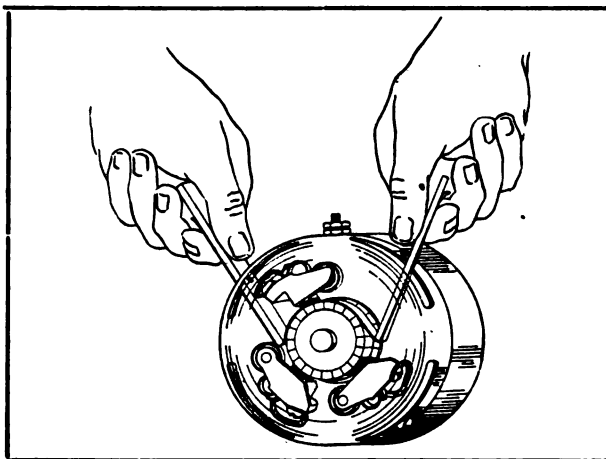


Figure 10, Correct Method of Sanding Upper Brush.

methods in common practise. In Figure 9 the sandpaper does not conform to the radius of the commutator, and this method should never be used. The additional thickness of the sandpaper makes the radius of the brush larger than that of the commutator, which will bear on the brush at only one point, thus making it necessary for the repairer to scrape the brush in to a good bearing. This may be done by wrapping a piece of sandpaper on a pencil (Figure 12). The repairer should remove that portion of the surface which presents a copper color after trial on the commutator. It will be necessary to try the brush several times before a satisfactory bearing will be attained. To test the bearing the brush should be set down on the commutator and the generator run as a motor by means of the current from the battery. To assist in wearing in the brush the repairer may exert a little pressure on it by means of a fiber-punch, which should be pressed down on the very center of the brush.

The bearing also may be scraped in with a

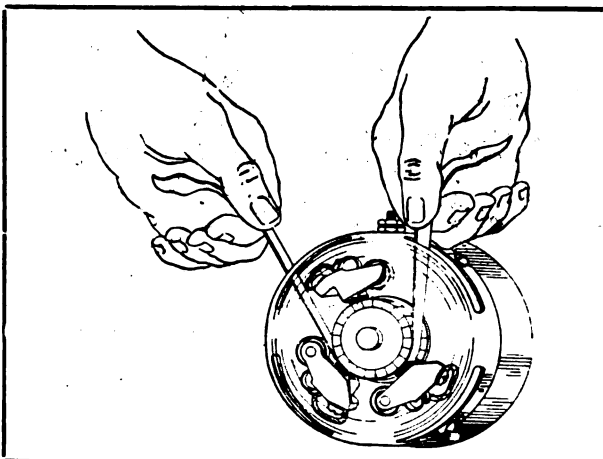


Figure 11, Correct Method of Sanding Two Lower Brushes.

### SETTING THE GENERATOR BRUSHES.

knife as shown in Figure 13. While the knife will be an easier tool to master, the repairer will find that the sandpaper method, when mastered, will do the work in much less time. When all three brushes are to be replaced at one time, it is advisable to use the tool shown in Figure 13. This consists of a scrap armature, together with its bearings and commutator. The commutator is turned  $1/32$ -inch undersize and a piece of sandpaper glued on to it. The edges of the sandpaper which meet are cut at an angle of about 10 degrees—this prevents the joint coming under one of the brushes all at once—thus providing a smooth contact at all times.

This armature is assembled in the generator with the front bracket which is to be used in the assembly. This locates the sandpaper in the same position as the surface of the commutator of the regular armature and a very accurate job may be obtained. With this method 75 per cent. of the brush surfaces will be found to have a perfect bearing after the generator has been run as a motor for 10 or 15 minutes, and those which are not perfect may easily be scraped in.

When the brushes are properly seated it is necessary to set them on the neutral point. While this is new practise in setting brushes, it has been found to work to best advantage on the Ford generator. To set the brushes on the neutral point loosen the four screws which hold the brush holder support to the brush end bracket and raise the third brush, holding it in a raised position by means of a spring against the side of the brush as shown in Figure 14. Unless the two brushes are in the neutral position, the armature will revolve in one direction or the other. By forcing

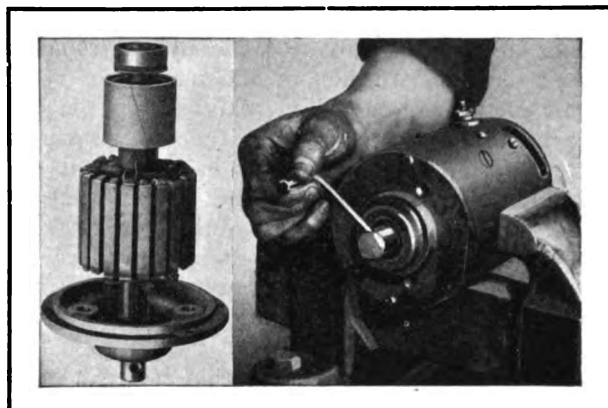


Figure 13, Left, Using Old Armature Wrapped with Sandpaper Around Commutator, Sanding Three Brushes at Once; Right, Turning Armature by Hand.

the brush holder support against the direction of rotation the armature will be brought to a standstill. This is the neutral point, and the brush holder support should be secured in this position by tightening the screws in the clamping ring.

The next thing that is necessary is to set the third brush. If no repair stand is available where the generator may be rotated from an outside source of power, it is necessary to install it on the engine and to make all necessary connections to complete the circuit between the generator and the battery. Now loosen the clamp nut on the third brush holder stud and drop the third brush on to the commutator. With the engine turning over at a speed which would drive the car at 20 miles an hour, and with the lights off, move the third brush backward or forward until the ammeter reads between 10 and 12 ampere charge. When this point is reached clamp the holder into position by running down the nut. (Remember this nut and post clamp on the fiber insulator and if too great a pressure is exerted on the nut the fiber will be cut, causing the field current to ground). Accelerate and retard the engine, watching the ammeter to see that it never reaches above 12 amperes charge. When the brush has been set to give the proper charging rate, examine the pig tails to see that there is no danger of their touching any of the metal parts of the generator and that the field leads are not rubbing on the commutator. When everything is all right, replace the dust cap, securing it with the screw at the top.

#### Ford Generator Armature Repairs.

The armature comprises a shaft, upon which is pressed a laminated core, about which the coils are wound, together with the coils, commutator and the ball bearings. When once properly installed there is little likelihood of trouble in this

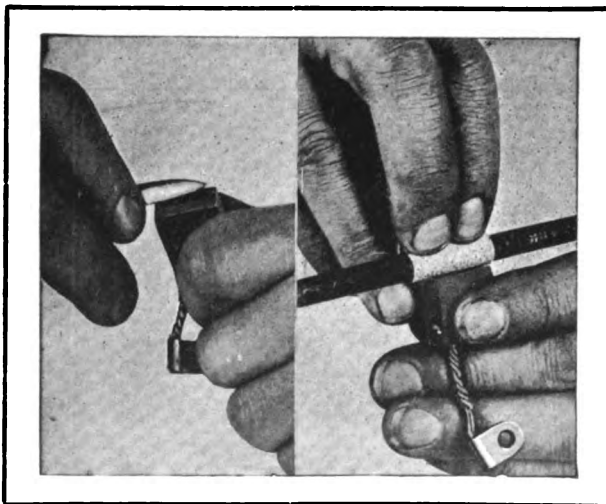


Figure 12, Left, Scraping Brush with Knife; Right, Finishing Off Brush Surface Using Sandpaper Wrapped Around Lead Pencil.



## REMOVING GENERATOR ARMATURE.

part of the generator, unless it is subjected to abuse. If the engine is run without the proper connections through the battery, an excess of current will flow through the fields, causing a higher voltage in the armature than it is able to withstand, and the insulation will be burned out, causing a short or ground. This will also occur if the cut-out does not close while the generator is running, or if it remains closed after the engine is stopped. In the latter case the current from the battery will discharge through the armature. Both of these conditions may be detected in time to save the generator by reading the ammeter on the instrument board. The commutator is subject to wear from the continual rubbing of the brushes, and in time it will need to be turned down in a lathe. The wiring sometimes becomes worn, due to foreign parts or the field leads rubbing them.

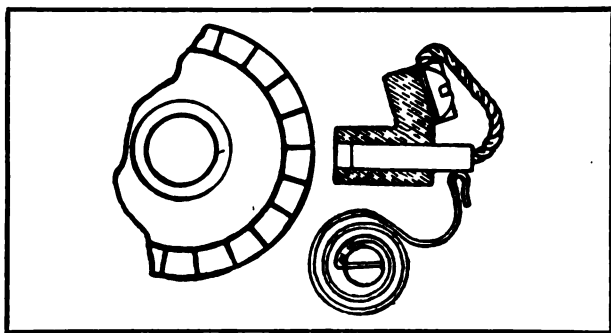


Figure 14, Holding in Raised Position by Means of Spring While Disassembling the Motor or Generator.

To remove the armature it is first necessary to raise the brushes from the commutator, holding them up by allowing the springs to rest against their sides. Run out the screws which hold the bracket to the yoke. This frees the bracket and it may be withdrawn, together with the armature, by tapping on the edge with a rawhide hammer, at the same time drawing it out with the left hand. The gear is removed from the shaft by driving out the pin and pulling it off with a special gear puller, which may be purchased from the Ford Motor Car Co.

To remove the armature from the bracket, simply drop it on a block, as shown in Figure 15 B. It is poor practise to strike the bracket with a hammer, as shown at Figure 15 A, as the shaft may be sprung, and this operation requires more time than the method just described. The bearings should be removed in an arbor press, after which the armature is completely dismantled.

There is one operation on the commutator which may be performed successfully in the aver-

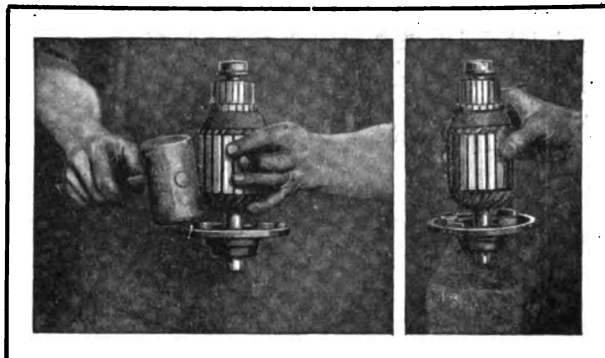


Figure 15—A, Left, Incorrect Method of Removing Armature from End Bracket; Figure 15 B, Right, Correct Method of Removal.

age garage. Sometimes the commutator wears down smoothly until the brushes rub on the mica between the segments, causing excessive arcing and heating. When this occurs the mica should be removed from  $1/64$  to  $1/32$  inch below the surface of the segments. This may be done with a broken hack saw blade. The repairer should be careful to see that the mica is removed clear to the edges of the copper segment, as shown in Figure 16 B. If it is left, as shown in Figure 16 A, the brushes will rub on it as badly as if it extended all the way across.

It sometimes occurs that the generator becomes water soaked, causing a short circuit in the commutator and wiring. Such an armature, together with the fields and brush holder bracket, should be dried in an oven at a temperature not to exceed 250 degrees Fahrenheit.

Tracing trouble in an armature is a very delicate operation and unless the repairer is very familiar with this class of work no repairs should be attempted—the armature should be returned to the manufacturer for credit. In replacing the new armature, it is first necessary to place the ball bearings on the shaft, forcing them well against the shoulder. Note the different diameters of the shaft and be sure that the proper bearing is put on each end, taking care to install the felt oil retainer behind the commutator and bearings. Next install the oil retaining disc on the gear end.

(To Be Continued in November Issue.)

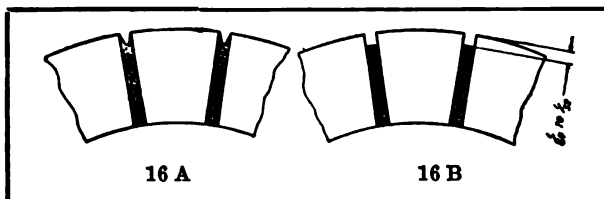
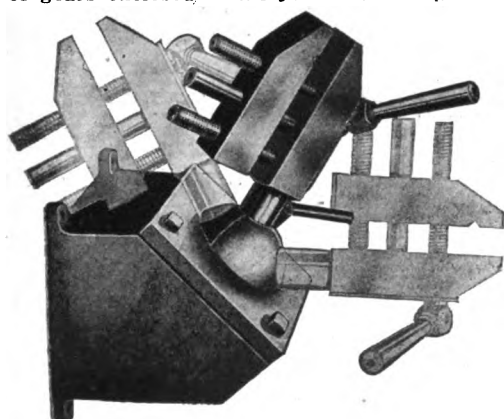


Figure 16 A, Incorrect Method of Undercutting Mica; Figure 16 B, Correct Method.

# ACCESSORIES, EQUIPMENT AND TOOLS FOR THE GARAGE AND REPAIR SHOP

**The Grip-Tite and Giant Handi-Vise Combination** is a patented bench tool that appeals to repairers and mechanics in the service station and machine shop because of the many unusual uses for which it is adapted. The Grip-Tite may be fastened to the work bench and the Giant Handi-Vise, fitting the ball socket, allows the vise to be turned to any convenient position and locked while work is being performed. The Handi-Vise consists of two heavy jaws made of wrought steel, while the jaws, gears and screws are case hardened and finished. The jaws of the Handi-Vise are opened and closed by means of the center rod, which in turn operates the end screws through a train of gears enclosed in the jaw made integ-



ral with the vise support. A locking device is located at the end of the first screw, which prevents the screws from allowing the jaws to loosen when work is being held in them.

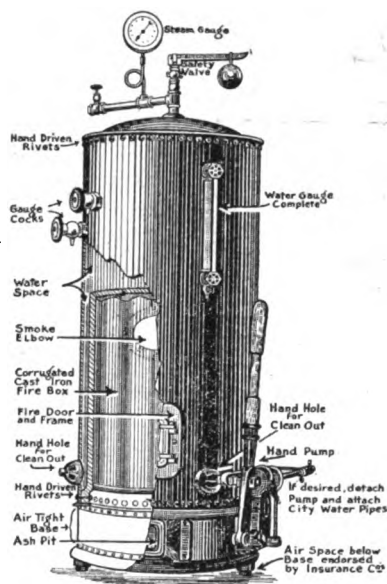
Many other useful and novel devices are manufactured by this manufacturer which fill admirably the needs of the repairer or mechanic in the service station and repair shop. Among these may be mentioned the Newman tall stock turret, Newman adjustable pull feed, Newman tool post turret, knurling tool, four-in-one changeable drill head and the Newman spot light bracket.

All tools made by this company show original design, are made of the best of materials obtainable and are accurate to a thousandth of an inch, it is stated. Tools of this type have a tendency to lessen the time required to perform a given operation, at the same time increasing the margin of safety of the mechanic or repairer using power machinery.

**Manufactured by the Newman Manufacturing Co., Cincinnati, O.** Prices and literature on request.

**The Gate City Steam Generator** is constructed from one piece of sheet steel with a cast iron head and corrugated fire box. The base is also cast iron and sheet steel and is raised from the floor as a protection against fire. There are no tubes to clog up with soot or burn out

and leak. The fittings are the best that money can buy and the hand pump can be placed either on the right or left side, or it can be connected to city water. Each generator is provided with three hand-hole plates easily accessible for cleaning out purposes, which may be necessary from lime or other deposits from the water used.



It is stated that the chief point in favor of the Gates city generator lies in its steaming qualities due to the corrugated fire box and direct water contact with all fire exposed surfaces. Garages, service stations and all branches of the automotive trades will find this generator very satisfactory for heating and steaming purposes, the manufacturer states.

**Manufactured by the Pechtel Iron Works, Keokuk, Ia.** Prices and literature on request.

**The Newson Tire Valve** is a patented article which has been on the market for some time and offers features that should recommend it to the trade, chief among them being that it is leak proof, which the manufacturer guarantees even in the large sized pneumatic tires used on many of the heavy trucks. The plunger passes through the valve stem and is equipped at the lower end with a rubber gasket, held in place by a metal band crimped over a flange so that it cannot collect dust or get out of place. This rubber gasket rests on the valve seat, which is countersunk into the swaged bottom of the valve. The air pressure in the tube, together with the spring in the valve stem, draws up the plunger, sealing it air tight. As a further insurance to make it 100 per cent. leak proof the cap nut screws on to the top, locking the plunger.

All parts of the valve are made of

brass, plated and machined to S. A. E. standards. They are assembled in the tube in the same manner as the ordinary valve. Every valve, it is stated, is

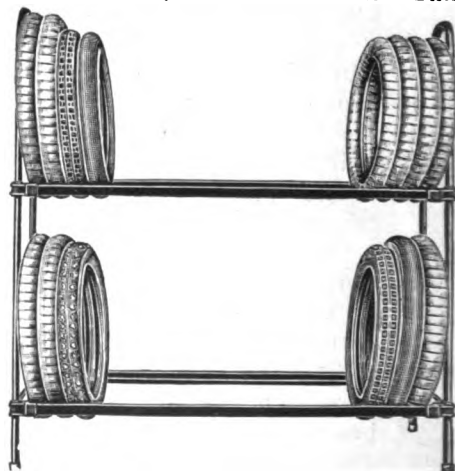


## FOR AUTO TIRE VALVES

tested and carefully inspected before leaving the factory, thus insuring uniform quality and reliability.

**Sold by the R. T. Sales Co., 3847 West Madison Street, Chicago, Ill.** Prices and literature on request.

**The Dow Stock and Display Rack for Automobile Tires**, shown in the illustration, is especially designed and constructed to display automobile tires of all sizes in a very attractive manner. This



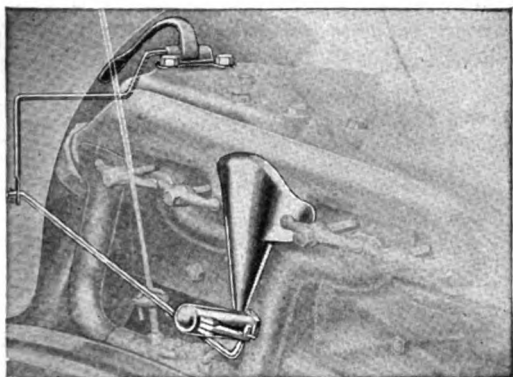
rack will accommodate 40 tires, size 30 by 3½ inches, and larger tires in proportion to their sizes. The rack is made of steel tubing and can be set up by anyone without the aid of tools.

**Manufactured by the Dow Wire and Iron Works, Louisville, Ky.** Prices and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The Footair Gas Saver and Accelerator for Ford Cars** is an attachment which is screwed into a hole drilled and threaded in the engine intake manifold and is connected through suitable linkage to an accelerator pedal located on the floor boards under the dash. A funnel and fastening are also provided which allow the entrance of fresh air to the Footair attachment, while a valve governs the flow of air into the intake manifold.

The manufacturer states that when the car is running on a good road at 20 miles



an hour, stepping on the accelerator and opening the air valve will cause a Ford to immediately increase its speed to between 25 and 30 miles an hour without changing the throttle position on the quadrant, showing that the admission of air alone causes increased speed. It is further stated that the device will naturally save gasoline, causing the engine to show greater mileage for the amount of fuel consumed. It is easily attached in a few minutes time and becomes a permanent part of the engine.

Manufactured by the American Automotive Accessories Co., Baltimore & Ohio Railroad and Blue Rock Street, Cincinnati, O. Prices, ready to attach, \$6.

**Ebonite** is the trade name adopted for a line of lubricants stated to be specially adapted for use in passenger car, truck and tractor transmissions, timing gears and differentials. The manufacturer states that by its own private process there is retained in Ebonite every atom of lubri-



cating value and quality found in petroleum, and that nothing, such as graphite, cork, filler or other foreign substance, is added to it in any form.

Ebonite is said to be a distillate residue of the highest grade petroleum pure oil; nothing more. Ebonite, it is further stated, spreads a film coating or resilient cushion over and between the gear mesh, which stays there and prevents metal to metal contact in a surprising degree, with corresponding reduction of noise and wear on the parts in play.

This lubricant is specially recommended for use in timing gears, transmissions and differentials of old cars where the parts have become worn and noisy. One filling of a tight transmission case, it is claimed, is sufficient for an entire season.

Ebonite is guaranteed to be exactly as represented. Instructions for its use accompany each barrel or container.

Manufactured by Bayson Oil Works, Erie, Pa. Prices and literature on request.

**The Tirometer Valve Gauge** is simply constructed, while the working parts are very few, consisting merely of an indicator mounted on a piano wire spring. A rubber valve passes through this spiral spring and connects with the valve itself. The pressure of the air in the tire expands this spring to the proper point on



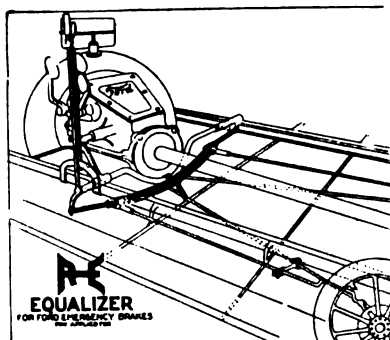
the gauge and is stated to be accurate up to within one pound. Each gauge is tested and one pound variation is the maximum allowed.

The gauge is covered by a transparent dust cap made of flint glass, which is tested at a pressure of 5000 pounds. The glass is especially thick and will, it is claimed, withstand all the shocks to which it may possibly be subjected. All metal parts are brass, nickel plated.

Manufactured by the Tirometer Corporation of America, Charleston, W. Va. Prices and literature on request.

**The Roose Emergency Brake Equalizer for Ford Cars** is an equalizing bar which fits across the frame side members and to which the emergency brake rods are attached.

The Emergency brake lever is attached to the equalizer at each end and causes, the manufacturer states, the brake to be applied to the rear wheels with equal



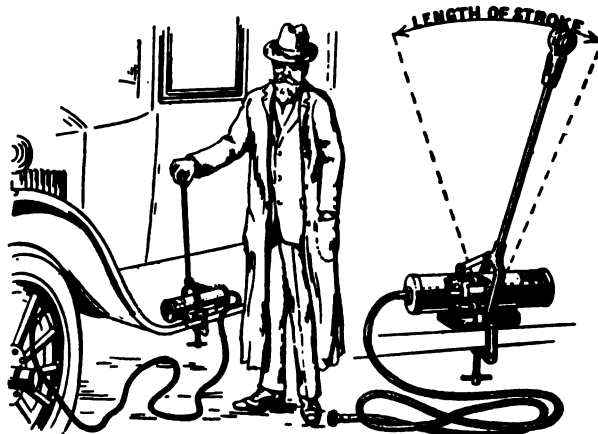
pressure. Three highly tempered coiled springs prevent the equalizer from becoming noisy and also act to release instantly when pressure is removed from the lever.

The R-E Equalizer is guaranteed by the manufacturer for the life of the car to which it is attached and, it is claimed, may be installed in 10 minutes time by any one without the use of tools.

Manufactured by the Roose Manufacturing Co., 827-33 West Main Street, Louisville, Ky. Price, \$1.50.

**The Durabilt Roller Bearing Tire Pump** is stated to be the result of more than two years of experimenting and testing under the most severe conditions and is designed for motorists who demand the best that money can buy.

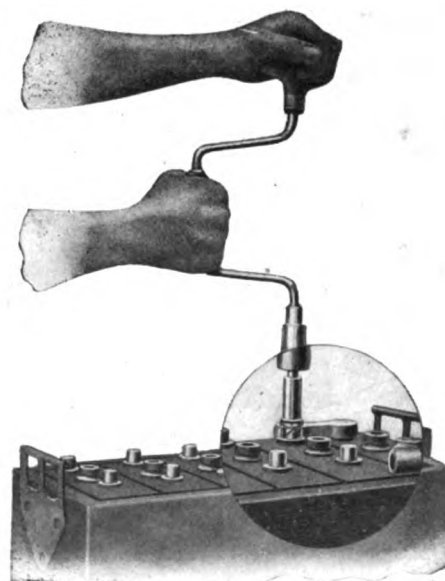
The Durabilt roller bearing tire pump is attached to the running board of the car by clamps and is operated by a vertical handle, easily worked from a stand-



ing position and may be readily manipulated by a woman. The pump is double acting or duplex and works at all times, it is stated, against only half the pressure of the tire. It is small in size and can easily be stored in a tool box or under the car seat.

Manufactured by Winstead Hardware Manufacturing Co., Winstead, Conn. Price on request.

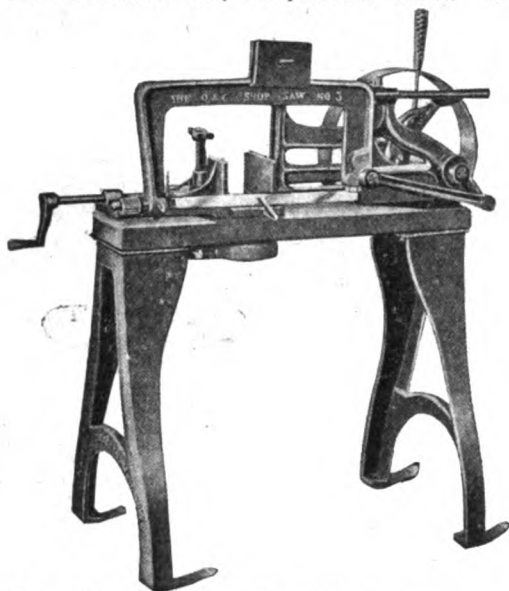
**The Storage Battery Link Cutter** is a device that may be used with an ordinary brace for cutting the lead from storage battery posts to facilitate the removal of the connecting straps or links. It is especially designed for this type of work and service stations catering to battery trade should find it very useful. It is patented and is so constructed as to remove just the proper amount of metal so that the link can be easily taken off without injuring the post or the sur-



rounding metal of the link. The posts are left in practically the same condition in which they were when assembled by the manufacturer, it is stated. Links removed in this manner, it is claimed, allow the repairer enough space to remove the plates easily from the cells.

Manufactured by the Auto Electric Sales Co., 2540 Hennepin Avenue, Minneapolis, Minn. Price \$6, shipped either C. O. D. or cash with order, as desired.

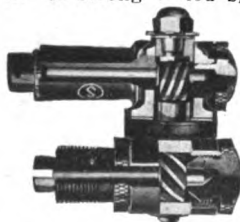
**Q & C Shop Saws** are designed for service station, garage and machine shop use, and embody the very latest features to be found in tools of this kind. Q & C shop saws are manufactured in three sizes as follows: No. 1, which has a cutting capacity up to and including four inches square and is provided with gravity feed so that it will handle any material of any shape within its capacity. No. 3 will handle stock up to five or six inches and is equipped with a swivel vise, which allows the stock to be cut to any angle up to and including 45 degrees. An adjustable automatic stop is provided which



stops the saw when the work is completed. The No. 4 saw has a larger capacity than either the No. 1 or No. 3, as it will easily cut stock up to seven by eight inches. The saw requires no attention when once started, being fitted with an automatic stop which can be set to stop the saw at any distance up to three inches above the table. The machine is fitted with a swivel vise so that cuts on material up to seven inches thick can be made at any angle up to and including 45 degrees. This machine can be equipped with motor drive when so ordered.

Manufactured by Hanna Engineering Works, 1765 Elston Avenue, Chicago, Ill. Prices and literature on request.

**The New Circle Speedometer Swivel Joint** is a replacement proposition for the thousands of speedometer swivel joints that are yearly wearing out. Worm gears and long bearings are provided for the drive from the wheel gear to the speedometer shaft, which the manufacturers claim will give service for at least 20,000 miles and withstand the constant road shocks and vibration without giving serious trouble. A strong coiled spring sup-



plies proper tension at all times to keep the driving worms in mesh, while the worm gear construction prevents, it is stated, the possibility of broken gear teeth.

The new Circle S swivel joint is made of the best materials obtainable and by experienced workmen and carries a broad guarantee.

Manufactured by the F. W. Stewart Manufacturing Corporation, 345 West Austin Avenue, Chicago, Ill. Prices and literature on request. Dealers' and jobbers' trade solicited.

**The Minuteman Tube Repair Kit** has been designed especially for the motorist and consists of sufficient sealfast, a superior high grade rubber material which is tested, it is stated, to withstand any amount of road heat to which a tire will ever be subjected.

The outfit contains 96 square inches of sealfast, a sealed tube of special cleaning compound, and a buffer for rubbing the surface of the tube.

It is stated that the action of the special sealfast compound, when worked into the buffed surface of the inner tube surrounding the injured part, is such as to

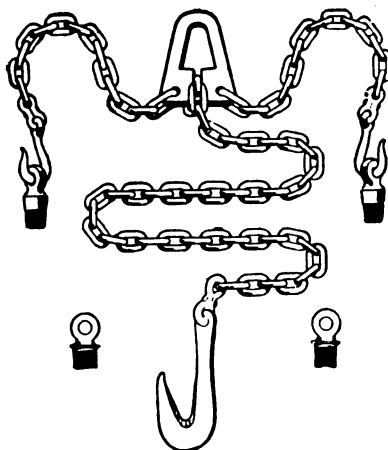


return the surface rubber to a semi-cure, into which the sealfast patch welds itself by pressure, leaving no line of separation.

The friction of the tire in action on the road is sufficient to vulcanize the patch to the tube, and the hotter the tube gets, it is claimed, the tighter the patch adheres to the tube.

Manufactured by Robert M. Powers Co., 124-26 East Ohio Street, Indianapolis, Ind. Price, \$1.50.

**Hobart's Auxiliary Chain Hoist** should prove a very handy device in service stations and garages where a considerable amount of engine overhauling or heavy lifting is necessary. It is a practical three-chain auxiliary device which can be quickly adjusted to fit all types of engines and may be used with any pulley hoist.



The Hobart Auxiliary Chain Hoist consists of two 18-inch chains with lifting hooks, one adjustable center chain 40 inches long and a 4 1/2 by 3 1/4-inch steel triangle plate which slips over the hook of the tackle block. Included in the out-

fit are one pair of half-inch and one pair of 3/4-inch eye plugs. These plugs screw into the spark plug openings and fit into the end chain hooks. The center chain is adjustable to any length by slipping any one of the links into the slot of the triangle plate. The links of the chain are made of 1/4-inch welded steel and have a lifting capacity of one ton, it is stated.

Manufactured by the Hobart Metal Manufacturing Co., Minneapolis, Minn. Price, net, to dealers, \$6.75; West of the Rockies, \$7.

**The Fore One-Piece Piston Ring** is of the lap jointed type, but differs from many of the rings of this type in the manner in which the ends overlap. The ends of the lap fit inside of the ring, thus being inside the piston ring groove when the ring is in position, and presenting a smooth surface to the wall of the cylinder. The lap of the joint is halved so that the ring may be sprung easily in placing it on the piston or when removing it when cleaning the grooves or fitting new rings, and the manufacturer claims, producing perfect compression and a gas tight ring which adds power and

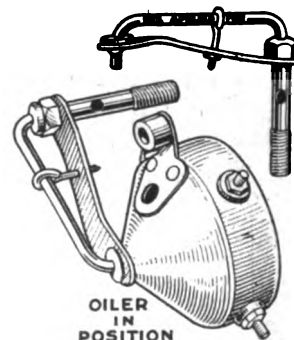


"pep" to the engine, insuring a better get-away and more life to the engine.

The construction of the ring is such that it has a perfectly sealed joint when compressed on the piston, that wear will not open its joints, and that the free ends will not score the walls of the cylinder.

Manufactured by the Fore Electrical Mfg. Co., 5255 North Market Street, St. Louis, Mo. Prices and literature on request.

**The H. F. Oiler for Ford Timers** is designed to supply oil to the Ford timer where lubricant is supplied to the engine reservoir through the breather pipe. The device consists of a special hollow stud bolt having a hole bored at one side into the center channel, which is fitted into a hole drilled crosswise of the breather pipe, and to this bolt is fastened, by means of a bushing, a short length of tubing, which is carried forward and down to the tension bar of the timer. A hole is drilled through this bar and the bearing point of the timer against which the

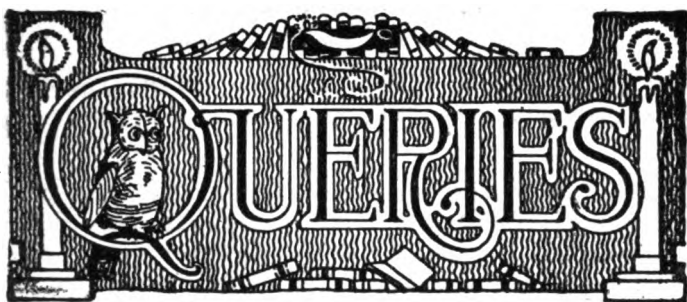


spring fits, and extends into the timer for a short distance. When oil is poured into the breather pipe, a portion strikes the bolt and the opening into the bolt, passing through the tubing down and into the timer case, oiling the timer roller.

It is claimed that this device provides a positive oiling system for the timer, and that further attention to lubrication is unnecessary. It is easily attached by any one handy with tools in a few minutes time.

Manufactured by H. E. Francisco, Francisco block, 5 1/2 South Federal Avenue, Mason City, Ia. Price, \$1.50 each, with full instructions for attaching.





### PROLONGING LIFE OF TIRES.

(A. C. H., Bellingham, Mass.)

Would you advise using inside tires or would it be better to use some form of tread? The tires now on my car have been run 300 miles. What I want is to use something to make them puncture and blow-out proof, as near as I can. The set of four tires I am now using cost about \$55. I can buy four inside tires for \$8.75 which are guaranteed to prevent 90 per cent. of punctures and blow-outs. Are the inside tires harmful to the tubes? What about leather treads with steel studs to grip the road? The claim is that they cannot be punctured or blown out, are guaranteed 10,000 to 20,000 miles and are said to equal chains to prevent skidding. A set of four would cost me \$45.62.

You will find the most satisfactory results are obtained from following the plan 95 per cent. of automobile owners follow, that is, to use standard casings and inner tubes, without experimenting with other devices the value of which has not been demonstrated. The inside tire proposition sometimes works out satisfactorily, and they do undoubtedly increase freedom from punctures and give additional wear to the tires; however, unless they are cemented to the inside of the casings they are liable to cause heating of the tires as the result of the friction, and this will reduce the life of the tire.

Results have shown that the use of a steel-studded tread on a number of cars has apparently given excellent results. Recently the writer saw a set of 32 by four-inch tires that had been driven over 7000 miles and very little wear showed. Their chief objection is their expense.

### TO REMOVE STICKING NUTS.

(W. L., Leominster, Mass.)

I have been having an unusual amount of trouble lately in removing nuts that stick. I have tried all the ordinary means that I can think of and they will not budge. Is there anything you can suggest?

Nuts that have refused to yield to most any other treatment can frequently be started as follows: Heat slightly an ordinary single-spanner wrench that fits the nut and let it rest on the nut for a few minutes. The heat transmitted from the spanner expands the nut so that it can usually be turned off without further trouble. Do not make the mistake of heating the nut with a blow torch as this expands the bolt as well so that the relative condition of the two is unaltered. Care should be taken that the heat is applied to the nut only, and this can be accomplished with the spanner wrench as stated.

### "CUTTLE-FISH" PAPER.

(T. A. W., Dover, Del.)

I have been told that there is a product known as "cuttle-fish" paper that is finer than the finest sand paper and is ideal for cleaning the contact points of ignition apparatus or the surface of a commutator on the starting motor or lighting dynamo. I would like to know if you can give me any information as to where this material can be obtained, as I have tried a number of accessory and hardware stores and they do not have it.

We understand that this "cuttle-fish" paper is carried in stock by dental supply stores, and probably some of the well-equipped larger drug stores could supply you.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

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## GREB AUTOMATIC GRIP PULLER

BEACH PATENT

A garage and repair shop necessity. Adjusts instantly, grips firmly and cannot unhook. As noted in illustration, it can be made into a two-arm puller. Also has three 12-inch arms opening to 18 inches. The



Grebe Automatic Grip Puller has many uses and will soon pay for itself. Ask your jobber or write for our Ten-Day Trial Proposition. You need this tool in your business.  
No. 1 for.....wheels and large gears  
No. 2 for.....magnetos and generators  
No. 3 for.....average gears

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## FORD STARTER \$20 SAVES TIME, LABOR and MONEY

It prevents injury of the driver. And Safety First is worth the cost. Constructed to the practical lever principle, it is operated by a pull from the seat. It is positive, cannot become defective, and it is sold with an unconditional guarantee of satisfaction.

It is extremely simple and can be installed by any owner without special tools or fittings, the two bolts necessary being supplied.

It is interchangeable and can be used on any Ford car or truck.

The price is \$20 at most any jobber or dealer wherever automobiles are used, or is sold direct.

Other starters cost more, but none is better built nor more reliable.

**AMERICAN SIMPLEX COMPANY**

Anderson

Indiana

(When Writing to Advertisers, Please Mention the Automobile Journal.)

### SPICER AND BENDIX DRIVES.

(K. C. B., New London, Conn.)

What is the Spicer drive? I also hear the term "Bendix drive" frequently used. Will you kindly explain what it means?

One of the greatest steps forward in automobile design was the adoption of the Spicer drive, that is, the drive from the transmission to the rear axle through a two-point propeller shaft. If the engine of your car is running at 1000 revolutions a minute, the propeller shaft at times may run at a maximum of 1050 revolutions and again at times as low as 900 revolutions, the engine all the time turning at 1000 revolutions a minute, providing the angle made by the universal joint is 15 degrees. The speed of the shaft fluctuates as much as five per cent. in this case, because of the fact that one part of the universal joint runs at one speed and the part directly attached to it at another, and these speeds will vary even during one revolution of the joint. The greatest the angle the joint makes, the greater the speed fluctuations. Now were it not for certain provisions made in the design, such as the adoption of the Spicer drive, such excessive stresses would be put on the parts in the transmission system as to appreciably reduce their life.

By means of two universals, the driving member and the driven member run always at the same speed, though the propeller shaft in between the two fluctuates. The driving shaft comes out of the transmission and the driven shaft is the pinion shaft which operates the differential ring gear. But in all cases where a Spicer universal joint system is employed, in addition to the two universals, it will be found that the line drive avoids angles even though it is not absolutely necessary. It is possible to get along with one universal joint on the propeller shaft if the line drive is straight or at least has very little angularity, because if the angle is only six degrees the speed fluctuation would amount to only one per cent. But even this small amount of fluctuation can be detected in the modern, smooth running, multi-cylinder cars; hence the almost universal use of two joints in high class cars.

#### The Bendix Drive.

The Bendix drive is the name commonly applied to the gearing which transmits the power from the starting motor to the automobile engine. It gets its name from the inventor of the device, Victor Bendix. It was developed with the idea of doing away with the necessity of the driver having to throw the starting motor gears into mesh with the flywheel teeth by a manual shift, but having the operation performed automatically. On the starting motor shaft, which is free to rotate and turns with considerable energy when the starting switch is closed, is bolted a heavy coiled spring and a long, square threaded bolt. The spring and bolt normally turn with the shaft of the motor. Loose on the bolt is a small gear or pinion which has a rim which is heavier on one side than the other. When the shaft commences to revolve it turns rapidly, but on account of its inertia the pinion does not turn. The bolt turns inside the pinion and the pinion is screwed out along the bolt similarly as though the pinion were held in the hand and the bolt were rotated. The pinion is pushed into engagement with the teeth of the flywheel and thus actuates the engine. When the engine gets to firing it runs faster than the starting motor shaft and turns the pinion with it and is screwed back on the shaft and out of engagement. The utility of having one side of the rim heavier than the other is now seen in that it jams the pinion on the screw so that it will not re-engage even if the starting motor is not stopped at once. The coiled spring is fitted to help absorb the strain of the sudden taking hold of the gear. All the power transmitted to the flywheel rim goes through the coiled spring.

**RENEWING SHABBY TOP.**

(A. L., Jonesville, Ind.)

I have run my car now for two seasons and notice that the top is beginning to look somewhat shabby. What can I do to renew it? It seems to be perfectly whole and good, except in appearance.

A small can of a good leather renewer should make your top look as good as new. A very satisfactory renewer is made of water proof pyroxylin compound, containing black coloring matter. If the surface is cracked, provided the cracks do not extend all the way through, the leather renewer will fill them and make a smooth, uniformly even surface, and when dry the top will be found to have a tough water proof film that will defy the elements for some months. One coat of the renewer can be applied in about an hour. The top should be scrubbed or cleaned and then allowed to dry thoroughly before the renewer is applied. The film dries quickly and a second coat is necessary only when deep cracks are to be filled. If you do the work yourself the total cost should not exceed \$1.

The life of the top, as well as its general appearance, is improved if the slip cover is always put over the top when it is down in order to keep out dust and dirt. Too few car owners are particular in this respect. Of course it should be unnecessary to state that care should be exercised when putting down the top that the folds of the material do not get between the bows. Celluloid lights can be made clear by wiping them off with a woolen cloth saturated in equal parts of ether and alcohol, but it should be remembered that this liquid is inflammable and should not be exposed to open lights. The top should never be folded when damp, as mildew will develop, which will rot the material. Mohair or other cloth material should be thoroughly brushed with a whisk broom, and any spots can be removed by sponging with warm water and castile soap.

If the car is to be laid up for the winter the top should be left up, the upholstery thoroughly cleaned and dried and then covered with large sheets of cheese cloth. The interior will also be better protected from moisture and dust if the side curtains are attached.

**ENGINE STARTS HARD.**

(W. H. D., N. Scituate, Mass.)

On cold mornings I have much trouble in starting my engine, although I fill the radiator with hot water and prime the cylinders. It feels as though the pistons must freeze in the cylinders, the engine cranks so hard. What can I do to better the situation?

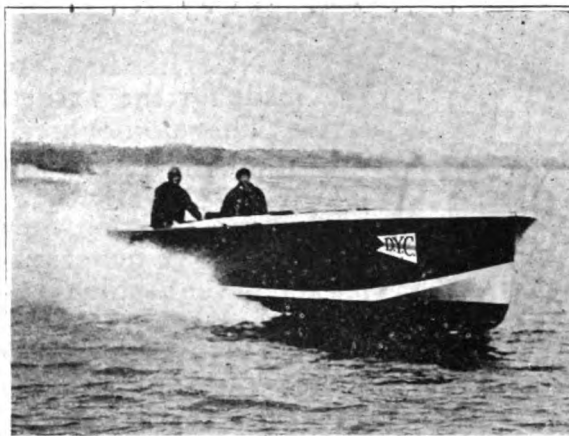
A warm garage is the only satisfactory remedy, but the use of a different engine oil, that does not stiffen so much at low temperatures may be of some assistance. Some motorists think that jacking up one rear wheel and turning the engine over by the wheel is easier than doing it with the crank. Try priming the engine cylinders with high-test gasoline or a mixture of gasoline and ether. Keeping the cylinders slightly warm, by running an electric heater, under the hood, during the night, might be found to be worth while. One of the numerous electric manifold heaters now being marketed, connected to the battery of the car will help considerably in warming the gasoline before starting.

**REMOVAL OF VERDIGRIS.**

(V. R., Burnham, Mo.)

I wish to clean a lot of brass work that has become badly coated with verdigris. Ordinary metal polish does not seem to work very well, and I thought you might be able to help me out.

The verdigris that forms on brass may be removed by using a good metal polish, mixed in equal parts with wood alcohol. Apply with a brush and allow to dry; then rub with a clean cloth and the verdigris will come off, leaving a clean, smooth surface, which may be polished in the usual way.



At over 70 miles an hour "Miss America," Zenith-equipped, wins the Gold Cup and shatters all records of from 5 to 30 miles.

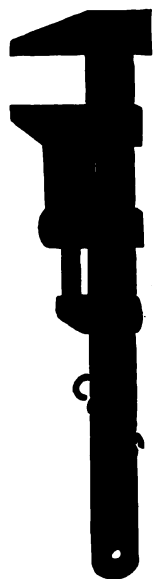
Whenever dependable carburetion is essential Zenith supremacy has been proven, on the water, on the land and in the air.

**Zenith Carburetor Co.**  
New York DETROIT Chicago

**ZENITH**  
CARBURETORS



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**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.

## BATTERY IN CAR STORED FOR THE WINTER.

(J. A. R., Worcester, Mass.)

Will the battery run down while my car is standing idle all winter? If it will, what should I do with it? I had it recharged about three weeks ago and since then it has been in the car, which is standing idle in the shed.

Your battery will gradually lose its charge and when it does the plates are liable to be damaged by sulphating and the liquid is in danger of freezing, which might break the jars and spoil the plates. The usual rule is to give an idle battery a charge once every six weeks or so. If your shed is unheated, we advise you to remove the battery from the car and place it indoors, where it cannot freeze, and have it charged or at least tested, each six weeks. If it tests fully charged, nothing need be done to it except to keep the level of the liquid well above the plates. On no account expose the battery to low temperatures, unless it is fully charged.

## CARE OF PAINT.

(R. E. V., Vall Mills, N. Y.)

(a) Will you please tell me how to care for the paint on a new sedan which has never been washed?

(b) When the car comes in covered with dust should the car be washed or simply dusted off with cheese cloth or some other soft material?

(c) How should the car be stored for winter as regards the paint? Is it necessary to keep the car in warm storage as long as there is no dampness in the room?

In reply to the above questions, all the instruction books issued by the makers of high-class cars particularly caution that extreme care should be used in washing the car, especially during the first few months that it is in use. Even the best of varnish requires time to thoroughly season and until then is easily affected. Gasoline or soaps that are injurious to varnishes should never be used. In fact, soap should never be used for washing a car except for removing grease and then only the purest, such as castile or some other known non-alkali soap should be used. Use only with plenty of water and rinse the body thoroughly with luke warm water. Never use extremely hot or cold water for washing the body. Mud, water, grease or oil should not be allowed to remain on a car longer than it is possible to avoid. This is particularly true of a new car on which the finish may not be thoroughly seasoned. Soak mud off with plenty of water instead of rubbing it off. After thoroughly rinsing, dry the varnish by the use of a clean chamois skin, well wrung out from time to time. Move the chamois in long, straight sweeps rather than with a circular motion.

It is better to remove heavily accumulated dust by washing rather than by dusting. For ordinary light dusting, a woolen duster is preferable to one made of feathers. If a soft cloth is used, one should be careful that it is perfectly clean and free from all gritty particles and that its texture is free from all stiff, harsh fibers or threads.

In regard to storing the car for the winter, it seems to be the general opinion among expert painters that it is more important that a vehicle be stored in a place where the temperature would not vary suddenly rather than it should necessarily be a heated room. Finish will stand considerable variation of gradual change in temperature without appreciable harm, but as you suggest, all dampness should be eliminated. And, of course, it is unnecessary to call attention to the fact that all stable fumes are deadly to varnish. All water should be removed from the cooling system before going into winter quarters. The car should be jacked up so that the weight does not rest on the tires, all exposed metal parts covered with grease and the car covered with a cloth or paper slip cover. A subdued, even light from all sides is recommended for the storage apartment.

Varnish on a black ground always has a slight greenish tint. Continued absence of light, as when a body is stored in a dark place or left crated, increases the greenish cast. Washing the stored body at least twice a month will reduce the change in the color of the varnish. However, varnish that has turned green from storage in a dark place will resume its natural shade after lengthy exposure to the light.

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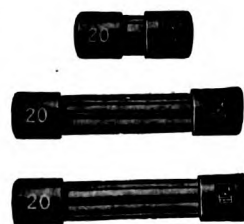
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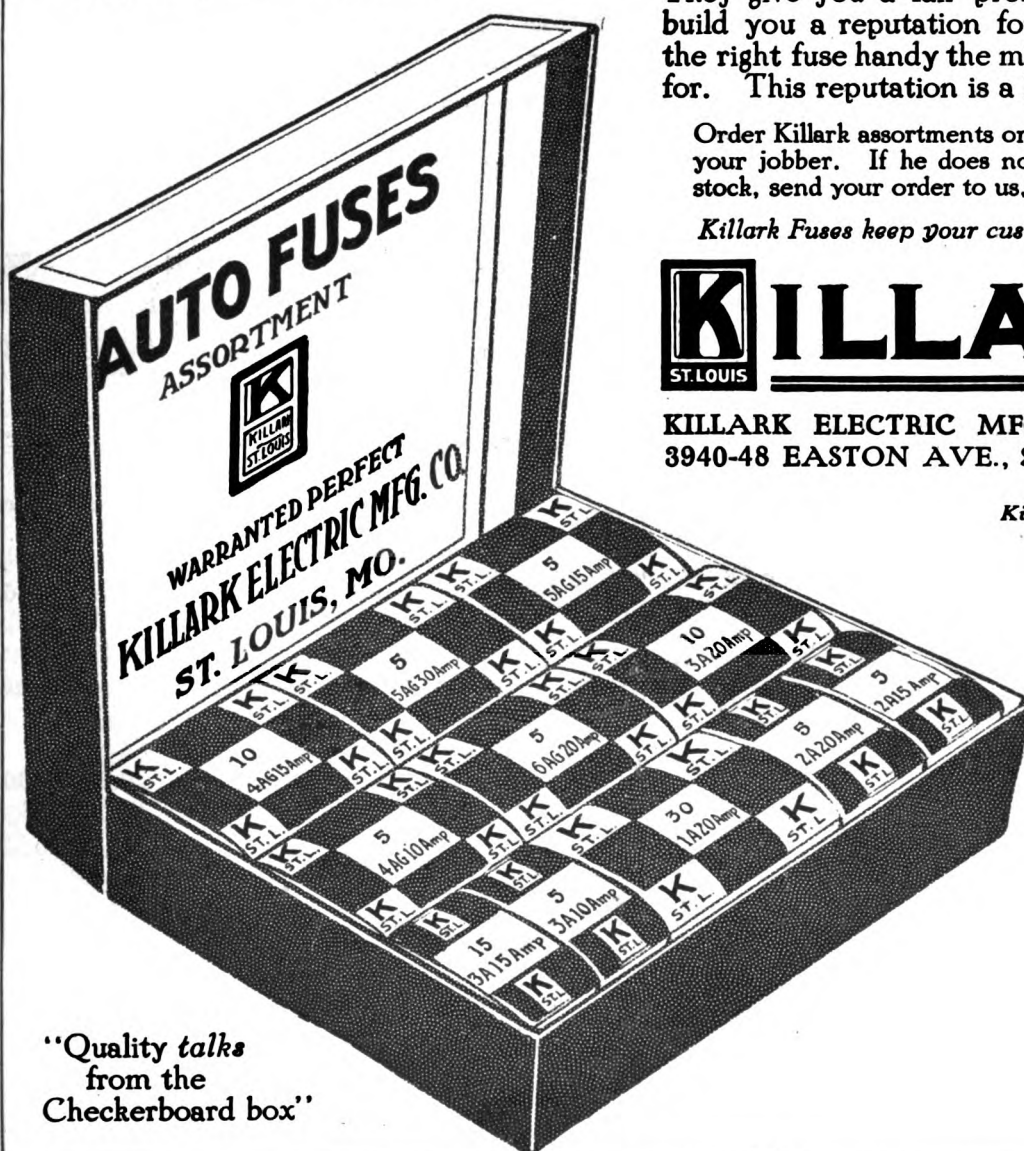
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JOURNAL**  
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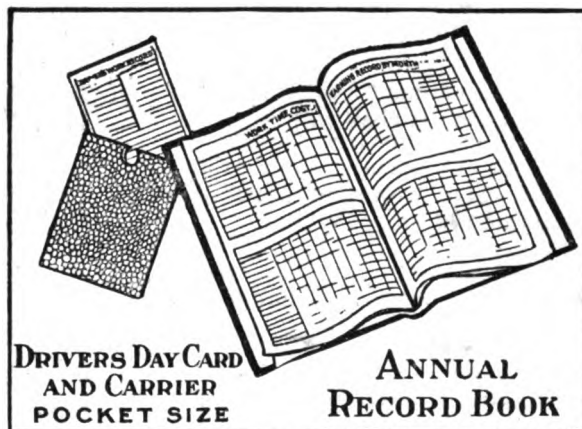
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**Know what it costs to Run your Truck**  
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**Know your Truck Profit and Loss**

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The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

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It is extremely simple. 100% complete and full working instructions are supplied with each system.

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This top was named "Faultless" because it was made that way.

It was built to please people who have said they "wouldn't have" a demountable top.

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**WHERE, HOW, WHY, IT IS SUPERIOR.**

Order a demonstrator top at once. It will sell many for you this year, and they'll make friends and boosters.

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Get the full details and sales plans and make some real money.

Mail the coupon. Size up this live proposition.

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SOFT, CLEAN, WHITE COTTON  
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SE-MENT-OL Liquid, kept in the radiator, will keep the cooling system leak-proof for the life of the car. It is the *original* self-acting radiator repairer.

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# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., NOVEMBER, 1920.

NO. 4.

## Auspicious Inauguration of America's Annual Show Season

*Big National Events Will Be Supplemented by Large Number of Representative Exhibitions in Important Centers.*

THE annual show season of America's second greatest industry is now auspiciously inaugurated, and the next three or four months will be replete with these events, which make so strong an appeal to a large proportion of those engaged in modern business, social, trade and industrial pursuits, and are stimulative to all phases of the automotive industry.

The passenger car show season opens with the Automobile Salon in New York city, which is always considered the "de luxe" initial event in its particular field, including as it does representative high-class American cars and novelties, as well as the culled favorites from abroad, while during the same week, Nov. 15-20, the Coliseum at Chicago is the scene of the big opening card in the accessory line, the annual exhibition and convention of the Automotive Equipment association.

The Automobile Salon is held in the Hotel Commodore, the entire second floor of which is devoted to the exhibits, including the main, east and west ball rooms and the grand foyer. The list of American cars that have been previously seen at the Salon is aug-

mented this year by the addition of Packard, Pierce-Arrow and Winton models, and well-known foreign makes again put on view, after an absence of several years, are the Panhard and Minerva. Models shown are supplied with the most complete and luxurious equipment that the most fastidious taste could possibly demand.

Chicago is also to have a Salon of its own this year early in January in the grand ball room of the new Drake hotel.

### The National Shows.

The big national shows promise to equal in volume and interest any previ-

ous event. The New York and Chicago exhibitions will not include trucks this season, as was the case last, but there will be an independent truck show in New York city in the 12th Regiment armory, under the auspices of the Motor Truck Association of America, Jan. 3-8, the week previous to the passenger car event. The pleasure cars will be shown again this season in the Grand Central Palace the week of Jan. 8-15. The Chicago show will be staged in the Coliseum, Jan. 29-Feb. 4, but there will be no trucks on view there under national auspices. The accessory industry

will be well represented at both national shows.

The big Boston exhibition will be along the same effective lines and in the same location, the Mechanics' building, as last season. It will include passenger cars, trucks, tractors, etc., together with their concomitant accessories. The date is the week of March 12-19. A second big event in the accessory field this year will be the third annual exhibition of the Automobile Accessories branch of the National Hardware Association of the United States in the Coliseum at St. Louis, Mo., Nov. 30 to Dec. 3.



### Minor Shows Galore.

Scrutiny of the accompanying list of exhibitions, conventions and similar events will reveal the diversity and comprehensiveness of this important feature of the automotive industry. Nearly every section of the country is covered by events staged in its important centers and they are anticipated as the real opening of a new year's activities in the world of motordom.

## The Season's Show Offerings

Nov. 17-18—Ohio Implement Dealers' Association, Columbus; Secretary, J. H. Goldcamp, Lancaster, O.

Nov. 18-19—Detroit, Mich., Annual Meeting, Motor Truck Sales Managers' Association.

Nov. 20-28—Houston, Tex., Annual Automobile Show.

Nov. 30-Dec. 3—St. Louis, Mo., Third Annual Meeting and Exhibition, Accessories Branch, National Hardware Association of the United States, Coliseum.

December—Fayetteville, N. C., Second Annual Show, Passenger Cars, Trucks, Tractors and Accessories, Tobacco Warehouse. Dan S. Hollenga, Manager, Box 465.

Dec. 1-3—Indiana Implement Dealers' Association, Indianapolis; Secretary, T. H. McGeorge, Covington, Ind.

Dec. 6-9—Iowa Implement Dealers' Association, Des Moines; Secretary, T. F. Wherry, Des Moines. Exhibit.

Dec. 7-10—Wisconsin Implement Dealers' Association, Milwaukee; Secretary, R. G. Nuss, Madison. Exhibit.

Dec. 7-10—Michigan Implement Dealers' Association at Grand Rapids; Secretary, L. F. Wolf, Mt. Clemens. Exhibit.

Dec. 7-10—New York City, Annual Meeting, American Society of Mechanical Engineers, Engineering Societies' Building.

Dec. 8-10—Cincinnati, O., Convention, Ohio Automotive Trade Association. E. J. Shover, Secretary, 404 Central National Bank Building, Columbus, O.

Dec. 9-10—Cincinnati, O., Annual Convention, Ohio Automobile Jobbers' Association.

Dec. 9-10—Columbia, S. C., Annual Meeting, South Carolina Automotive Trade Association.

Dec. 10-18—New York, N. Y., Motor Boat Show, Grand Central Palace.

Dec. 10-19—Brussels, Belgium, First Post-War Show, Palais du Cinquante-naire, Chambre Syndicale de l'Automobile.

Dec. 13-18—Ottumwa, Ia., Second Annual Show, Passenger Cars and Accessories. F. T. Lynch, Manager, 211 East Main Street.

Dec. 14—New York City, Motor Boat Meeting, Society of Automotive Engineers.

Dec. 14-16—Illinois Implement Dealers' Association, Peoria; Secretary, W. L. Derry, Vermont, Ill.

Dec. 28-30—Chicago, Ill., Annual Meeting, Society of Agricultural Engineers.

Jan., 1921—Little Rock, Ark., Annual Meeting, Arkansas Good Roads & Drainage Association. Robert O. Schaefer, Secretary, Masonic Temple, Little Rock.

January—Toledo, O., 13th Annual Show, Passenger Cars, Trucks, Tractors and Accessories. Terminal Auditorium. H. V. Buelow, Manager.

January—Seattle, Wash., Passenger Car, Truck and Accessories Show, Motor Car Dealers' Association.

January—Spokane, Wash., Passenger Car and Truck Show, Automobile Chamber of Commerce. E. M. Stock, Manager.

Jan. 3-8—New York, N. Y., Motor Truck Show, Motor Truck Association of America, 12th Regiment Armory. Theodore D. Pratt, Manager.

Jan. 4—New York City, Annual Meeting, Automotive Service Association of New York.

Jan. 4-7—South Dakota Implement Dealers' Association, Sioux Falls; Secretary, C. J. Bach, Sioux Falls.

Jan. 5-7—Midwest Implement Dealers' Association, Omaha; Secretary, James Wallace, Council Bluffs, Ia.

Jan. 7—Sydney, Australia, Australian Motor Show.

Jan. 8-15—New York City, National Passenger Car Show, Grand Central Palace.

Jan. 11—New York City, Meeting, Eastern Automotive Equipment Association.

Jan. 11-13—New York City, 11th Annual Meeting, Society of Automotive Engineers, Hotel Astor.

Jan. 11-13—Minneapolis, Minn., Annual Convention, Minnesota Implement Dealers' Association, West Hotel. C. I. Buxton, Secretary, Owatonna, Minn.

Jan. 11-13—Mississippi Valley Implement Dealers' Association, at St. Louis; Secretary, F. E. Goodwin, Kirkwood, Mo.

Jan. 16-22—Milwaukee, Wis., Annual Passenger Car and Truck Show, Milwaukee Automotive Dealers' Association, Auditorium. Bart J. Ruddle, Manager.

Jan. 16-22—Schenectady, N. Y., Show, Company E, F and Machine Gun Company, State Armory. J. J. Callahan, Manager, Box 1186, Pittsfield, Mass.

Jan. 17-22—Lowell, Mass., Sixth Annual Show, Passenger Cars, Trucks and Accessories, Casino. Dan O'Dea, Manager, 154 Moody Street.

Jan. 18-20—Pacific Northwest Hardware and Implement Association, Spokane, Wash.; Secretary, E. E. Lucas, Spokane, Wash.

Jan. 18-20—Western Retail Implement, Vehicle and Hardware Association, Kansas City; Secretary, H. J. Hodge, Abilene, Kan.

Jan. 18-20—Texas Hardware and Implement Association, Dallas; Secretary, A. M. Cox, Dallas.

Jan. 19—Milwaukee, Wis., First Annual Convention, Wisconsin Automobile Dealers' Association.

Jan. 22-29—Cleveland, O., Passenger Car Show, Cleveland Automobile Manufacturers' & Dealers' Association, Wignome Coliseum. Fred H. Caley, Manager.

Jan. 22-29—Ceylon, India, Automobile Show, Ceylon Motor Show Syndicate.

Jan. 22-31—Sydney, Australia, Second Annual M. T. A. Motor Show. N. Kingsley-Strack, Secretary, Challis House, Martin Place, Sydney.

Jan. 23-29—Amsterdam, N. Y., Annual Automobile Show, Benefit Company H, State Armory. J. J. Callahan, Manager.

Jan. 24-29—Atlanta, Ga., Annual Convention, Georgia Automotive Dealers' Association. P. A. Magahee, Secretary.

Jan. 25-27—Kentucky Hardware and Implement Association, Louisville; Secretary, J. M. Stone, Sturgis, Ky. Exhibit.

Jan. 25-28—Oregon Retail Hardware & Implement Dealers' Association Convention, Portland. E. E. Lucas, Secretary, Hutton Building, Spokane, Wash.

Jan. 26-28—North Dakota Implement Dealers' Association, Fargo; Secretary, R. A. Lathrop, Hope, North Dakota. Exhibit.

Jan. 29-Feb. 4—Chicago, Ill., National Passenger Car Show, Coliseum, N. A. A. C.

Jan. 30-Feb. 5—Hudson, N. Y., Annual Automobile Show, Armory. J. J. Callahan, Manager.

Jan. 31—Chicago, Ill., Annual Meeting, National Automobile Dealers' Association, La Salle Hotel.

Feb. 2—Chicago, Ill., Winter Meeting, Society of Automotive Engineers, Hotel Morrison.

Feb. 5-12—Minneapolis, Minn., Annual Winter Automobile Show, Minneapolis Automobile Trade Association. Walter R. Wilmot, Manager, 709 Andrus Building.

Feb. 6-12—Newburgh, N. Y., Annual Automobile Show, Benefit Companies E and L, State Armory. J. J. Callahan, Manager.

Feb. 7-12—Columbus, O., National Tractor Show, Columbus Tractor and Implement Club, Ohio State Fair Grounds.

Feb. 7-12—Parsons, Kan., Fifth Annual Automobile and Accessory Dealers' Association Show, Passenger Cars, Trucks, Tractors and Accessories. W. N. Chapman, Secretary, 1818 Broadway.

Feb. 8-10—Oklahoma Hardware and Implement Association Convention, Oklahoma City. W. B. Porch, Secretary-Treasurer, Oklahoma City.

Feb. 10—Columbus, O., Tractor Meeting, Association of Automotive Engineers.

Feb. 12-19—Kansas City, Mo., Annual Passenger Car and Truck Show, Kansas City Motor Car Dealers' Association. Ed. E. Peake, Manager.

Feb. 14-19—St. Louis, Mo., 14th Annual Show, Passenger Cars, Trucks and Accessories. Robert E. Lee, Manager, 3124 Locust Street.

Feb. 18-28—San Bernardino, Cal., Show, Passenger Cars, Trucks, Tractors and Accessories. Fred M. Renfro, Manager, Chamber of Commerce Building.

Feb. 19-26—Newark, N. J., Passenger Car, Truck and Accessory Show, Newark Auto Trade Association, First Regiment Armory. Claude E. Holgate, Manager.

Feb. 20-26—Pittsfield, Mass., Annual Automobile Show, Benefit Company F, State Armory. J. J. Callahan, Manager.

Feb. 21-26—Deadwood, S. D., Eighth Annual Automobile Show, Auditorium, Passenger Cars, Trucks, Tractors and Accessories.

Feb. 21-26—Bethlehem, Pa., Seventh Annual Show, Passenger Cars and Accessories, Coliseum, Broadway and Montclair streets. J. L. Elliott, Manager, 1038 Norway Place.

Feb. 21-26—Elmira, N. Y., 11th Annual Passenger Car Show, Elmira Auto Club, State Armory. H. S. Bryan, Manager, 210 East Water Street.

Feb. 28-March 5—Bethlehem, Pa., Truck and Tractor Show, Coliseum, Broadway and Montclair Streets. J. L. Elliott, Manager, 1038 Norway Place.

March—Buenos Aires, Argentina, Exhibition of American Products.

March—Ardmore, Okla., Fourth Annual Show, Passenger Cars, Trucks, Tractors, Accessories, Oils and Tires. R. F. Beede, Manager, Beede-Witt Co., North Washington Street.

March—Fort Dodge, Ia., Closed Car Show, Armory, Fort Dodge Auto Dealers' Association.

March or April—New Orleans, La., Passenger Car Show, Automobile Dealers' Association of New Orleans.

March 1-5—Quincy, Ill., Third Annual Auto Show, Passenger Cars, Trucks and Accessories. J. W. Hart, Secretary, Whig Journal.

March 7-12—Indianapolis, Ind., 22nd Semi-Annual Show, Passenger Cars, Trucks, Accessories and Farm Lighting Outfits. John B. Orman, Manager, 338 North Delaware Avenue.

March 7-12—Paterson, N. J., Fifth Annual Show, Passenger Cars, Trucks, Tractors and Accessories, Fifth Regiment Armory. H. MacGinley, Manager.

March 7-12—Scranton, Pa., 11th Annual Show, Passenger Cars, Trucks, Tractors and Accessories. Hugh B. Anderson, Manager, Board of Trade Building.

March 12-19—Boston, Mass., 18th Annual Automobile Show, Boston Automobile Dealers' Association, Mechanics' Building. Chester I. Campbell, Manager, 5 Park Square.

March 14-19—Trenton, N. J., Sixth Annual Passenger Car and Truck Show, Trenton Automobile Trade Association, Second Regiment Armory. Frederick Perry, Jr., Manager, West, State and Willow Streets.

March 15—Fort Worth, Tex., 24th Annual Southwestern Exposition and Fat Stock Show. Passenger Cars, Trucks and Tractors. M. Sasson, Jr., Secretary.

March 20-26—Torrington, Conn., Show, Company M, State Armory. J. J. Callahan, Manager, Box 1186, Pittsfield, Mass.

March 25—York, Pa., Passenger Car, Truck and Tractor Show, York Auto Dealers' Association.

April 3-9—Gloversville, N. Y., Annual Gloversville-Johnstown Automobile Show, State Armory. J. J. Callahan, Manager.



## SOME PRACTICAL TESTS TO DETERMINE QUALITY OF OILS

**M**OST of the reputable oil companies will disclose the laboratory test figures of their lubricants if the buyer insists on having them, and, in the case of the standard brands, the figures are dependable. The figures given usually are the following: Gravity, flash point, fire test and viscosity. The companies have other test figures, some of which are of interest to the user. Viscosity at 212 degrees, cold test, per cent. of acid, per cent. of coke residuum.

In comparing various oils the figures which should receive most consideration are the viscosity at 212 degrees, the gravity and the amount of carbon, or "coke" residue. Some of the cheaper oils show fairly good viscosity at ordinary temperatures, but, when subjected to heat, become almost useless as a lubricant.

Gravity, while it has nothing to do with lubricating qualities, is an index of the purity of an oil, as well as of its origin, the oils from the eastern fields having a paraffin base, being lighter than

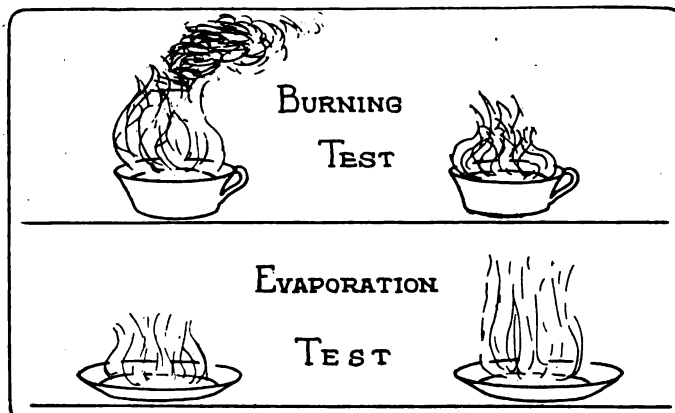
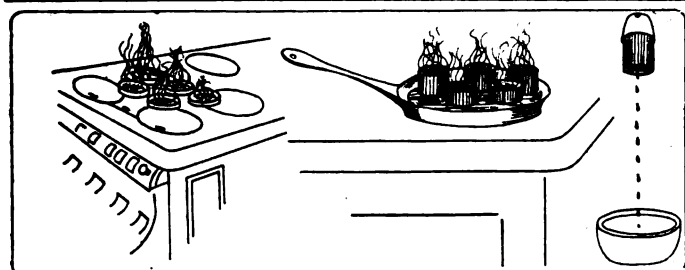
the highest flash test, the relative values of the others being in the inverse order of their removal from the stove.

Partly fill a number of small tins of the same kind and size with the different samples. Place these in a saucepan large enough to accommodate them and partly fill with hot water, the level of which should be somewhat below the tops of the tins, which should be covered. Place on the stove and bring the water to a boil. Allow it to boil for some time (the saucepan may be covered) as oil absorbs heat slowly. Prepare another tin by drilling or punching a small hole through its bottom, say about 1/16 or 3/32 inch in diameter. After the oil in the tins has become heated to the boiling point of the water, empty the contents of one of the tins in the improvised "viscosimeter" and carefully note the time taken for the oil to pass through the small hole. The other samples should be kept on the stove in the meantime, and tested in turn, the elapsed time of each percolation being jotted

ple shows superiority in all tests, but it is safe to assume that the one which stands nearest to the top of the list, in the several tests, will give best results.

In testing two or more samples of gasoline probably the simplest method would be to place a given quantity of each in a shallow plate, and place these in the sun, or where a draught of air will assist evaporation. The plates should be of the same size and shape, and should be placed out of doors and safely distant from any exposed flame. An idea of the comparative volatility of the samples can be obtained in this way.

A somewhat similar test, occupying less time, may be made by placing equal quantities in cups of the same size and igniting the samples. The one burning out most quickly, giving off the least black smoke and leaving the least deposit in the cup, is the best. In observing the residue it should be noted that a precipitation of dry soot in the cup is less objectionable than a deposit of a soft, gummy nature.



the products of the southern and western fields, having asphaltum base. The "coke" test is also an indication of the purity of an oil, although it does not necessarily indicate the tendency of the oil to leave deposits in an engine.

To roughly determine the relative merits of several kinds of oil, the following procedure is suggested:

Procure as many covers of baking powder or coffee cans as there are samples to be compared. Put about two tablespoonfuls of each oil in each of these lids and place them on a hot stove. If the receptacles containing the samples are numbered for identification, the small tins may also be conveniently numbered by placing in them short pieces of wire, shot or small pebbles to the number equal to that of the respective samples. The lids should be placed closely adjacent, to insure uniform heating. As soon as one of the heated samples begins to give off smoky vapor it should be removed and placed to one side, and so on with the next, placing them in consecutive arrangement. The one standing the longest heat will have

down for later comparison. It is essential that the quantity of each sample be exactly the same, and that the top of the perforated can be uncovered. The sample requiring the most time to pass through is the best.

A hydrometer is the most convenient means of making this test. If a regular oil hydrometer is not available a gasoline hydrometer may be used, these being quite common. The sample in which the instrument floats the lowest is the lightest and the best.

Place equal parts of oil and clean water in a bottle, having a bottle for each sample and filling them approximately half full. Each bottle should be given a vigorous shaking for 15 or 20 minutes and then allowed to stand for 24 hours. Oils free from acid will entirely separate from the water which will be clean, while those containing acid will remain partly emulsified and present a cloudy appearance. Instead of shaking the mixtures of oil and water may be agitated with an egg beater, and then placed in the bottles or in glasses.

It will often be found that no one sam-

### TO FACILITATE STARTING.

The majority of starting difficulties are attributed to poor fuel and cold weather when, in reality, the trouble in a large percentage of cases is directly due to some lack of adjustment or proper care. Often leaky valves, poor ignition, improper carburetion or low battery will be found the cause of the difficulty. Any one of these things is sufficient in itself to cause trouble, but when three or four such ailments occur in combination the result is serious difficulty in starting.

A few precautions will avoid the majority of these starting troubles, as well as insure better running performance, as in most cases an engine that is hard to start is not dependable in action.

The following instructions, if followed carefully, will result in easy starting and a smooth running engine: Grind valves and carefully check up valve push rod adjustment; examine spark plugs and breaker contact points—see that they are in good condition and the spark gaps are correct; recharge the battery if any cells show below .1260.

## Novel Automayer System of Lubrication and Jacking

**A**MONG the novel devices recently brought out for automatically oiling motor cars from the dash, as well as for automatically raising a motor car off the ground is the Auto-Mayer system invented by F. D. Mayer, president of the Essenkey Products Co., 220 West Superior street, Chicago, Ill. In describing the Auto-Mayer oiling system, attention is called to the fact that ordinary lubricating oil is used, carried in the tank under the hood of the car, and drawn therefrom by a single-cylinder pump operated by gears from the magneto shaft, the oil being forced into a

pressure. Turning the indicator knob actuates the cam which is located on the back of the dash and this raises the plunger of the valve, or by-pass, permitting the oil to be forced out of the reservoir into the line or lines leading to the cup or cups.

Oiling the car in this way daily may possibly entail a small waste of lubricant, but perfect and constant lubrication is insured even to the point of forcing out old oil, it is claimed, which may contain dirt or grit, and replacing it with new oil. Movable parts on the car may be served with flexible tubing.

the clutch attached to the pump, thus extending the jack and lifting the car. The jack may be closed again either by opening a by-pass or by springs, fitted for the purpose.

The car may be entirely raised from the floor by turning the knob on the dash indicator to a fixed point, thereby opening the four by-passes, after which the car may be locked in its jacked-up position, making it impossible to move the machine and taking all strain off the tires.

Both systems are controlled by safety valves and are stated to be practically fool-proof, and can be locked with a Yale key. They are protected by a number of patent claims covering all operations, attachments and use.

### MOTOR CAR DRIVING LIKENED TO GOLF.

The art of motor driving, like the game of golf, is a matter of form. Most motor car owners were apt to interpret the statement, however, as meaning that one must follow a set of hard and fast rules.

Form does not mean that every driver must drive the same way. The rules themselves must be put into operation in a way that will accommodate the physical possibilities of the driver.

An instructor may tell the beginner just how he should grip the wheel; just how high he should hold his hands on it, etc. He may be a long-armed driver and the position suggested may be the most efficient in that physical case. A short-armed driver, however, would be ill at ease, making his driving a bit of hard work rather than pleasure if he should attempt to do the same thing.

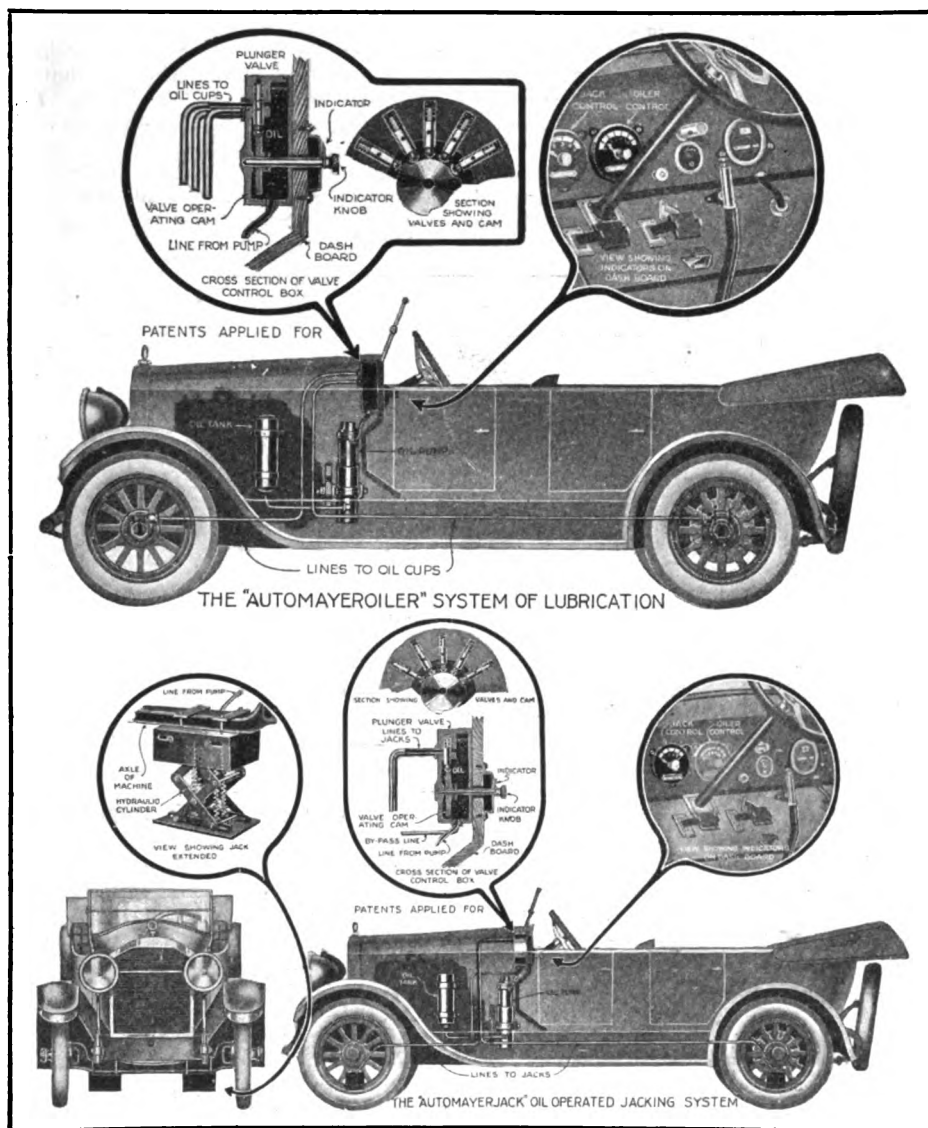
The motorist should first learn what is the right thing to do in handling the wheel, shifting gears and applying the brakes. He should study thoroughly the results desired and then adopt a method of getting the results which best suit his own physical condition. Good driving keeps money in automobile pocket book.

Easy starts and stops prevent unusual strain on the motor service, transmissions, axle and tires, not to mention a decrease in the consumption of gasoline and oil.

A well made motor is a sensitive piece of mechanism—it resents abuse, but it is capable of attaining great results when thoughtfully handled. Starting a motor car is a simple art, although there are thousands who never really acquire finish because of their lack of form. An expert driver begins to set up a steady pull on the driving mechanism from the moment he slips into first speed until his car is under full headway.

### REMOVING INSULATION.

In removing insulation from stranded wires be careful not to cut any of the fine threads. These are so small that it is an easy matter to slice off five or six with the insulation; but each does its share in carrying current to the lamps.



reservoir attached in front of the dash, under the hood, under pressure. From the reservoir ordinary brass or copper tubing form leads to the various grease cups on the car, these grease cups being self-closing and of ball-and-socket type.

When it is desired to lubricate any part of the car, the indicator knob on the dash is turned to the number corresponding with the particular cup to be filled or, in the event that it is desired to oil all parts of the car at once, the indicator knob may be turned to a specified point and, in two minutes, every cup will be filled with oil under

### Operation of Jacking System.

The operation of the jacking system is practically the same as that of the lubricating system insofar as the reservoir, pump, valves, cams and lead lines are concerned. The jacks are enclosed in dust-proof cases and are attached behind the front and rear axles at four points on the car. When it is desired to raise a particular wheel, the indicator knob is turned to the number corresponding to "right rear," or "left front," as may be necessary. Oil is then forced into the hydraulic cylinder, through the line from the oil reservoir, by engaging

# HUMOROUS SIDE OF MOTORING

## "GLIM WAS ON DE BLINK."

It was evening. A stranger approached the motorist.

"Sir," said he, "your beacon has ceased its function."

"Sir?"

"Your illuminator, I say, is shrouded in unmitigated oblivion."

"But, really, I don't quite—"

"The effulgence of your irradiator has evanesced."

Just then a boy shouted:

"Say, Mister, your light is out."

And the driver understood—Boston Globe.

## IMPROVING EACH SHINING HOUR.

A bee got into an automobile driven by Rev. John Brandon Peters at Cambridge, Md. The preacher ran the automobile into a pole bearing the feed wire bringing the electric current from Laurel to Cambridge. The wire was broken when the pole fell and Cambridge was dark that night.

## STRICTLY ON THE Q. T.

We are tipped off that the place for a quiet smoke is the garage at Sun City, Kansas, where a sign in the workshop reads: "No Smoking Aloud."—Kansas City Star.

## SOME COMBINATION.

House for Rent—Seven-year-old combined mare and runabout for sale.—Adv.

## THOUGHT HE WAS IN A GARAGE.

A chauffeur entered a Toronto restaurant recently and in anticipation of a good lunch, gave the following order:

"Coffee, doughnuts and pancakes."

For a moment or two he thought he had entered a garage by mistake when he heard his order passed along.

"Cylinder oil, couple of non-skids and some blowout patches."



## "WHAT IS HOME WITHOUT A CAR."

(Scenario of a Timely, One-Reel Drama.)

Experiencing a wave of economy, Jack Vandeventer, owner of a prosperous downtown drug store, and living in a desirable outlying residence section of his city, sold his car. This is what happened to him in one day:

Got up an hour early.  
Walked four blocks to catch street car.  
Missed car.  
Ignored by autoists on way down town.  
Waited 10 minutes.  
Boarded second car.  
Bawled out by conductor for not having change.

Gave seat to woman passenger.  
Stood up rest of way.  
Inhaled breath of darky standing on his foot.

Got off after 40 minutes ride.  
Arrived at store half an hour late.  
Took grouch out on clerks.  
Clerks got even by insulting customers.  
Lost sales and good will as result.  
Needed rare drug to fill prescription by 10 a. m.

Messenger sent on foot failed to arrive in time.  
Lost good will of patient and physician.  
Friend called asking to be taken to hospital.

Refused on account of no car.  
Business acquaintance called from railway station.

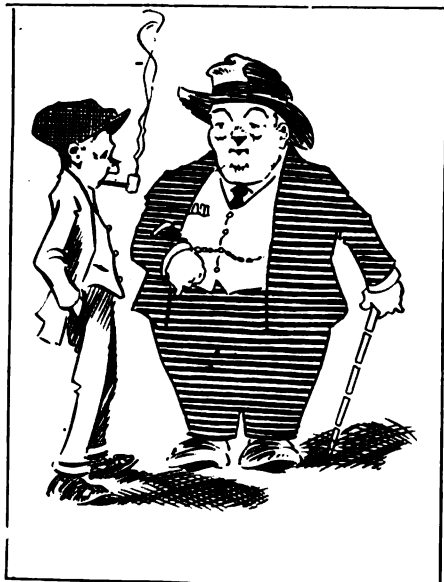
Missed chance to see him between trains.

Failed to go home to lunch.  
Walked to near-by restaurant.  
Waited 20 minutes for service.  
Food indifferent.

Insulted waiter with tip worth a gallon of gas.

Insulted check room girl same way.  
Discovered it was raining.  
Walked back to work with no umbrella.  
Got feet wet.

Dried clothes on radiator.  
Friend called with invitation for Sunday trip.



Automobile Salesman to Portly Prospect: "You've made a mistake. The truck department is the second door below."

Refused on account of no car.  
Wife 'phoned to meet unexpected relatives at 6 p. m.

Also asked to buy extra groceries, etc. Would have gone herself—but!!!

Left store an hour early.

Walked to market.

Feet still damp.

Bought 50 pounds of provisions.

Seemed like 150.

Back nearly broke.

Called taxicab.

Drove to station.

Train an hour late.

Dismissed taxi.

Cost: Five gallons of gas and an inner tube.

Greeted relatives coldly.

Hired another taxi.

Explained absence of car to relatives.

Explanation did not stick.

Fresh relative asked if business was bad.

Angry through rest of journey.

Cramped taxi did not help to clear atmosphere.

Legs crushed with weight of groceries.

Home at last.

Dismissed taxi.

Cost: New spot light and windshield wings.

Failed to embrace friend wife.

Result: Hard looks.

Went to change clothes.

Packed wrinkled suit to send to tailor.

Hat much worse for wear.

Feet still damp.

Took hot bath.

Also aspirin.

Ate late dinner.

Wife suggested going down to movie.

Vetoed on account of no car.

Friends called up with invitation to party.

Declined for same reason.

Then to bed.

Received curtain lecture from wife.

Remembered scheduled trip into country for provisions.

Remembered engagement to play golf following evening.

Wife remembered engagement at friend's suburban home.

All declared off.

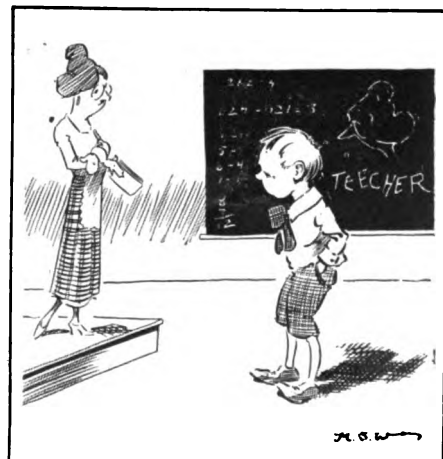
Good Night!

—National Motor Car & Vehicle Corp.

## ARITHMETIC UP-TO-DATE.

School Teacher (to little boy): "If a farmer raised 1700 bushels of wheat and sold it for \$1.17 per bushel, what will he get?"

Little Boy: "Automobile."



## The Condenser—Its Construction and Function

**N**EARLY all motorists and many repairers have a very hazy idea of the construction of the condenser and know very little of the duty it is designed to perform. About the limit of such knowledge is that there is such a unit in the ignition system, where it is located, and that if it is not in working order it must be removed and a new one fitted in its place, otherwise the contact points of the breaker box will become pitted and badly burned, due to the serious arcing that occurs between the points.

### Primary Circuit.

The action of the primary circuit is similar to that of the kick in a make-and-brake ignition system and the same kind of a flash spark which occurs between the igniter points will also take place at the interrupter points when the primary circuit is broken. In the jump-spark ignition system, such as is used on the modern automobile engine, this spark is prevented and the action of the coil is greatly improved by the use of a condenser. The condenser consists of two folded strips of tin foil insulated from each other by other strips of paraffined

paper, each strip of tin foil being provided with a terminal. The two condenser terminals are connected to the interrupter terminals, as shown in the diagram.

The condenser may be mounted either in the breaker head or coil housing, as there is no electrical circuit through a good condenser. If any current does pass through the condenser is defective and must be replaced. The condenser has the property of being able to absorb and discharge an electrical charge, and it is this characteristic which makes its use essential to jump-spark ignition.

Referring to the illustration, the operation of the condenser may be noted as follows: When the break of the primary circuit occurs the induced surge of current in the primary, which is in the same direction as the original battery current and which would otherwise cause an arcing of the contact points, rushes into the condenser and charges it. The side of the condenser which receives the surge is temporarily charged positively and the other side negatively. Instantly, the condenser discharges back through the primary winding and battery in the op-

posite direction in an attempt to equalize the potential of the two sides. As this backward surge is opposite in direction to the original magnetizing current, it assists in quickly reducing the magnetism of the core to zero, thus aiding in securing the maximum voltage in the secondary winding. In reality the current surges or oscillates to and fro from the condenser before it finally dies out. The initial condenser discharge is represented by the crooked arrows.

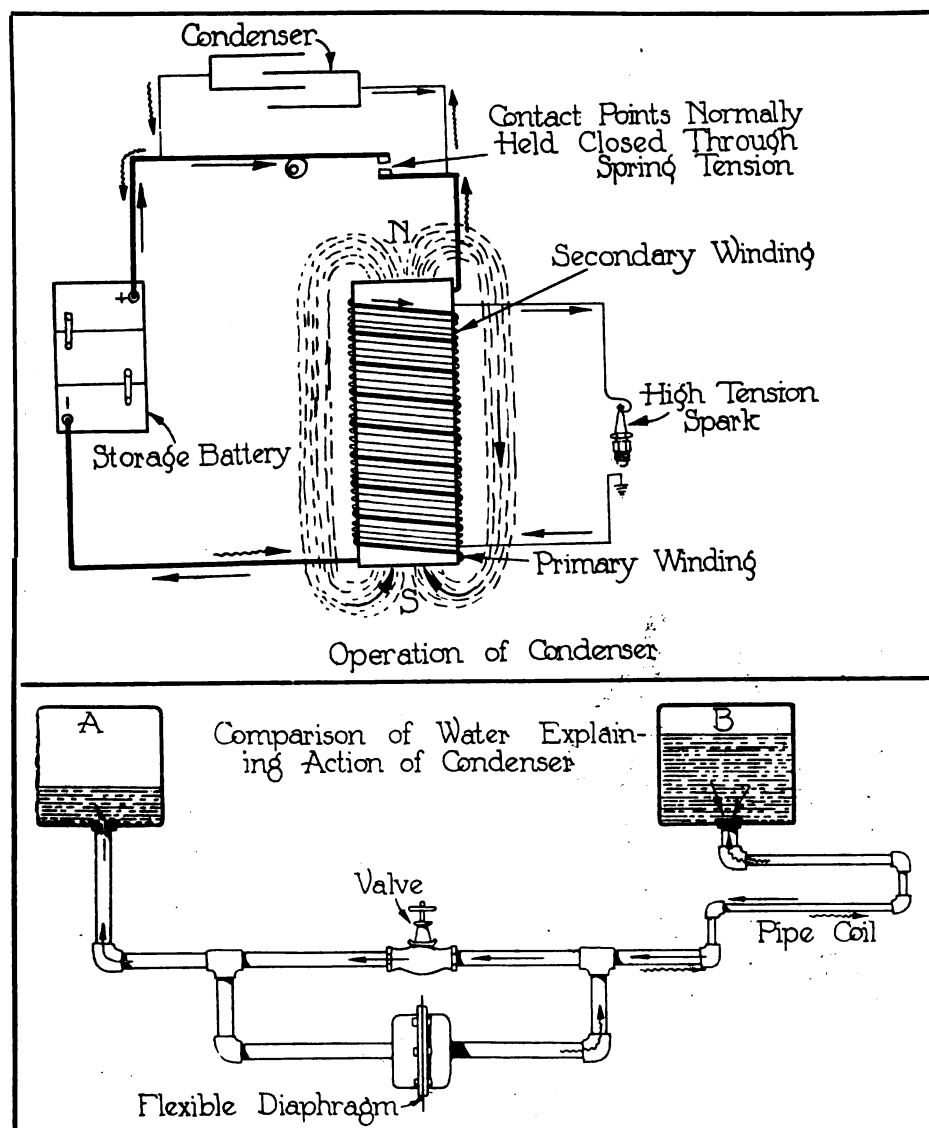
The action of the condenser may be compared to that of the flexible diaphragm shown in the diagram. When the valve is closed suddenly, cutting off the flow of water from B through the coil of pipe into A, the water will depress the diaphragm for an instant due to the momentum attained by the water. The diaphragm will then rebound immediately, forcing a surge of water back through the pipe into B; in fact the water will surge back and forth several times before it finally comes to a stand still. This action of the water is analogous to the surging of the electric current of the condenser.

### ALLEN MOTOR CARS HAVE NOVEL BODY FINISH.

Realizing the value of practical innovations, the Allen Motor Co. has announced a special line of colors for 1921 which has been named after the various precious stones. A beautiful dark blue has been called the sapphire, a rich, dark maroon is named the garnet, while two lighter shades are found in the turquoise, a light greenish blue and the amethyst, a very striking shade of lavender. Choice of colors is offered on the entire Allen line, including the sedan and artcraft models, which are entirely new with the Allen this coming season. The artcraft is a combination summer and winter car with imitation Spanish leather top and beveled plate glass panels which are removable. The line will be exhibited at the next big automobile shows, and it is possible that one will hear some enterprising salesman inviting the ladies to "step right this way—buy a touring car to match your jewels."

### MAYOR Hylan ON UTILITY OF AUTOMOBILE.

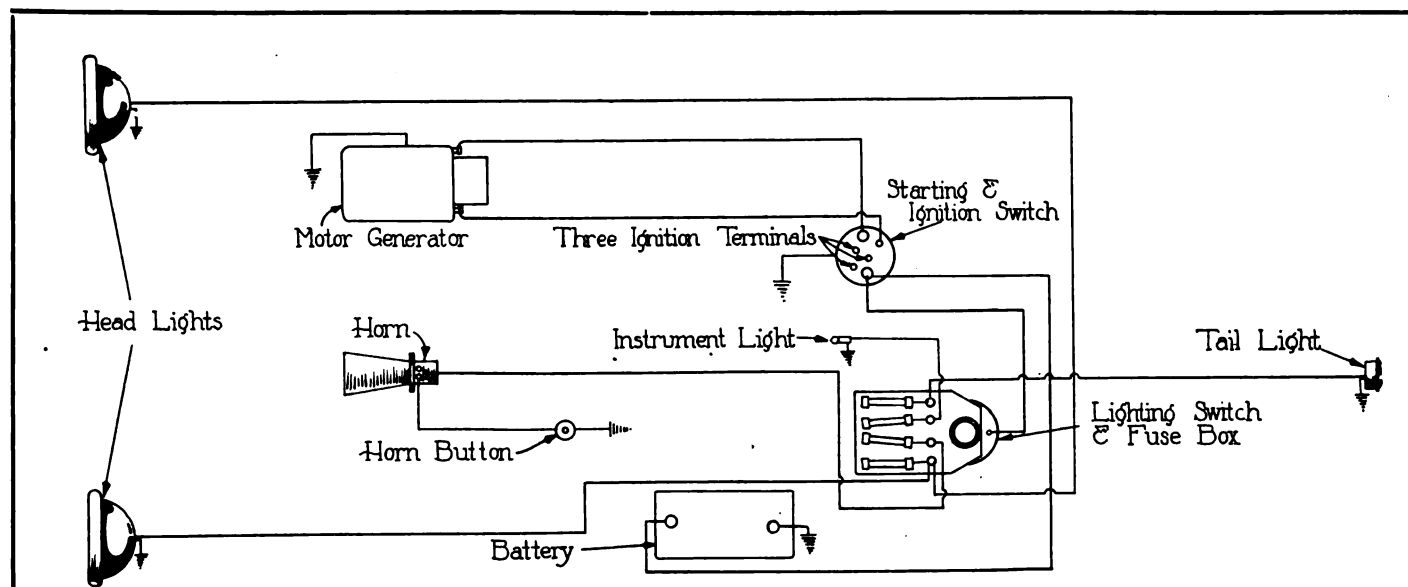
Mayor Hylan of New York city surely thinks the automobile is a utility. He went on record to this effect in a most forcible way during a recent discussion before the Board of Estimate regarding the use of city automobiles by municipal officials. The mayor said: "I use a city car and I have a city employee running it and I have no apologies to make. I am not a wealthy man and cannot afford to own several cars. I use the car to do city work and it is necessary for me to do this. I will continue to use it as long as my duties call me about as they do. I would like to ride in the trains, but time is too important for me to do much of this."



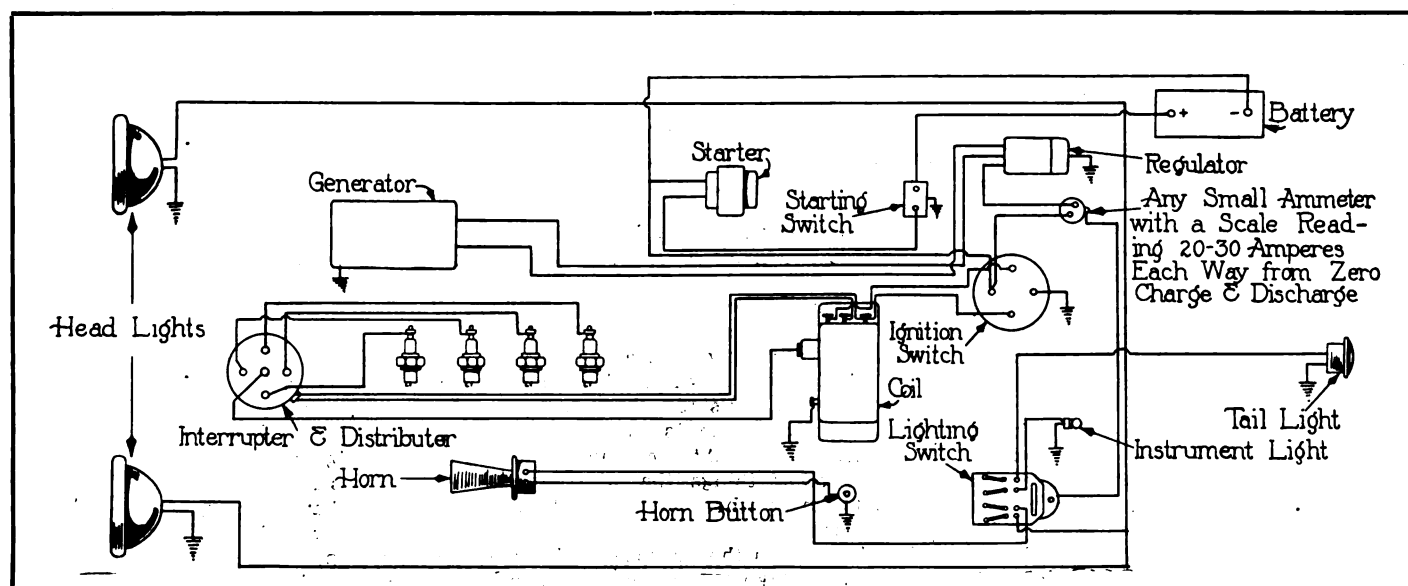
Upper Sketch Shows the Operation of Typical Condenser—Lower Out Explains Action of Condenser Through Analogy with Water Supply.



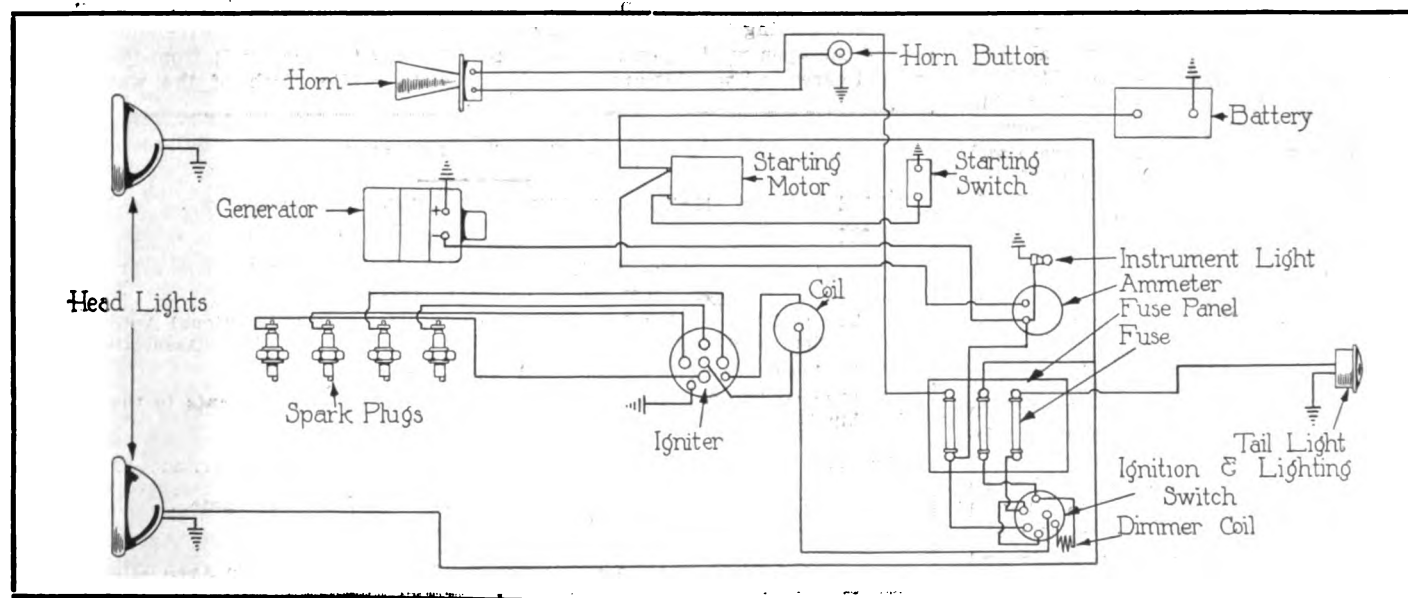
# Monthly Wiring Diagram No. 9



Hupmobile, Model K, 1915: Diagram of Horn, Starting and Lighting System.



Hupmobile, 1916, Series N Cars; Westinghouse Two-Unit, Single-Wire System.



Hupmobile, 1917-18-19, Model R. Using Westinghouse System.

# OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL  
HIGHWAYS  
ASSOCIATION

TOURING  
HIGHWAY  
LEGAL DEPTS.

9 PARK STREET, BOSTON, MASSACHUSETTS

## Extensive Plans for 1921 Tourist Information Bureau

**T**HE increasing number of tourists from year to year through New

England has led the National Automobile association to establish for the year 1921 the most complete automobile tourist information bureau in New England. In conformity with the policy of the association to give to its members the very highest grade service in its field, it has renewed for the season of 1921 its contract with the Blue Book Co., and will be in a position to furnish its members with the official Blue Book for 1921, recognized wherever tourists travel, as one of the most reliable and comprehensive road guides for motorists. While many of the members will, of course, prefer the New England edition, the association will be in a position to furnish those who send in their order in time, with any Blue Book they may desire, whether of New England, New York or the Transcontinental. But for those who take the New England edition and who desire to travel outside the bounds of this section, the bureau will be prepared to furnish accurate and reliable routes to any section of the United States based upon its Blue Book connections, giving not only directions for travel, but the general nature of the roads to be traversed, so that all members may have accurate advance information as to road conditions throughout the United States and Canada.

Tourists visiting the great New England summer playground of the nation next summer will find at the association's headquarters at 9 Park street, Boston, up-to-the-minute information on file for their convenience as to all road conditions, new construction, detours, etc. Full information as to hotels and rates and all other matters of interest

to the summer tourist will be at hand and courteous and efficient officials in charge who will be glad to help in every possible way.

The association urges all members to make free use of all its facilities for information. Write, call on the phone, or call in person when you are planning your tour and the bureau will take pleasure in posting you on all the conditions of the roads, will advise on the laws of the various states through which you will pass, the needs as to registration, license, headlights and the hundred and one other things that the tourist wants to know when on the road in a strange country.

In short, it is the purpose of this association to take away from its members all the cares and worries of motoring and place them upon its own shoulders, leaving to the tourist only the joys of the open road when nature beckons and cares and worries are cast aside.

To Florida Via Atlantic Highway.

Many members, when this issue is published, will be turning their eyes toward the southland for touring; in fact, the association has already had numerous inquiries as to the best route to Florida. Accordingly, for the general information of readers it is suggested that they follow their Blue Book routes at this season of the year from Boston via Worcester, Springfield, Hartford, Waterbury and Danbury to New York, thence following the general line of the Atlantic highway to Augusta, Ga. This route starts from New York city, leaving by the Wehauken ferry, thence through Newark, Elizabeth and New Brunswick to Trenton, thence to Philadelphia, thence via Baltimore to Washington and Richmond; thence via Raleigh, Pinehurst, Columbia to Augusta. Going this way the tourist finds excellent roads all the way to Richmond; from there to Augusta, while much of the way is over

### APPLICATION BLANK

BLUE  
BOOK

NATIONAL AUTOMOBILE ASSOCIATION

New England Department

NATIONAL HIGHWAYS ASSOCIATION

9 PARK STREET, BOSTON, MASS.

The undersigned hereby applies for membership in the National Automobile Association, New England Department of the National Highways Association.

Enclosed herewith you will find check for \$5.00.

If you wish the Blue Book sent to your address, add 15 cents to the Membership Fee for packing, insurance and postage.

Name..... Telephone.....

Address..... City..... State.....

Make of Car.....

Checks MUST be made payable to the National Automobile Association.

sand-clay roads, they are generally in pretty fair condition at this season of the year. However, caution should be exercised if wet weather is encountered, as they become very slippery when wet. From Augusta on the usual route has been via Savannah and Darien to Jacksonville, but owing to the discontinuance of the ferry at Darien it has been found advisable to send tourists this year via Macon, Perry and Waycross, or else down through Valdosta to Madison and thence across to Jacksonville. Down through this section of Georgia the roads are poor at best and the motorist who is accustomed to New England roads will find it hard going. This is particularly true in wet weather and the tourist should go well equipped with chains; a roll of burlap or of chicken wire in the tonneau is also a good thing to have along, as well as a good tow rope; and in case of tire trouble a good broad piece of board to make a foundation for the jack when jacking up a wheel.

This route shows a mileage of about 1445 miles from Boston to Jacksonville. The tourist may visit six state capitols en route, as well as the National Capitol. The trip is through an interesting country as far as Raleigh, but from Raleigh to Augusta is a bleak, scrub, flat country and entirely without interest. From there down it is a good farming country.

Membership in the National Automobile association which carries with it affiliation with the National Highways association, gives aid and support to making this Atlantic highway one of the great continental highways with which it is the purpose of the National Highways association to band the nation.

#### MASSACHUSETTS CAMPAIGN AGAINST SPEEDING.

The Massachusetts Department of Public Works, in charge of automobile regulation, is making a determined effort to stop speeding on the highways of the Commonwealth. To this end, exercising the discretion vested by law, Commissioner Goodwin has started the policy of revoking or suspending the licenses of operators upon two convictions. And in this connection it may be stated that the commissioner is treating a sentence imposed upon a plea of "nolo" as equivalent to a plea of "guilty," or a conviction upon a plea of "not guilty." For the month of September 424 licenses were revoked or suspended as against 244 for the same month of the preceding year. And the figures for October will be even more startling when compiled.

The association urges upon all members that they exercise the greatest caution in the operation of their cars for, with the rapidly increasing number of motor vehicles in use, it is the duty of every operator to have due regard for the rights of other travelers on the highways.

There are now 275,000 persons licensed to operate motor vehicles in

Massachusetts and the registrar reports that by Dec. 1, 1920, there will be upwards of 300,000 motor vehicles of all descriptions registered in Massachusetts. This increasing number means increasing danger unless everybody has due regard for the right of every other person on the highway whether motorist or foot traveler.

### Code of Approved Signals

REGISTER of Motor Vehicle Frank A. Goodwin of Massachusetts has approved a series of hand signals for power vehicle drivers which are practically the same as have been approved by the state officials of Connecticut, and the Massachusetts Safe Roads Federation has undertaken to carry on a campaign of education among all who own and drive automobile cars and trucks.

The imperative need of a system of signals is admitted. Hundreds of avoidable accidents happen daily that are the result of failure of one or more drivers understanding what seemingly is clear enough to the observer. The principal reason is that with no accepted code of signals the intention of the drivers is

signals cannot be seen.

The signals are described as given by a driver seated at the left side of the machine, but they can be given quite as well with either hand. The code is as follows:

**STOP:** Extend the left arm and hold it stationary, with all fingers extended and close together.

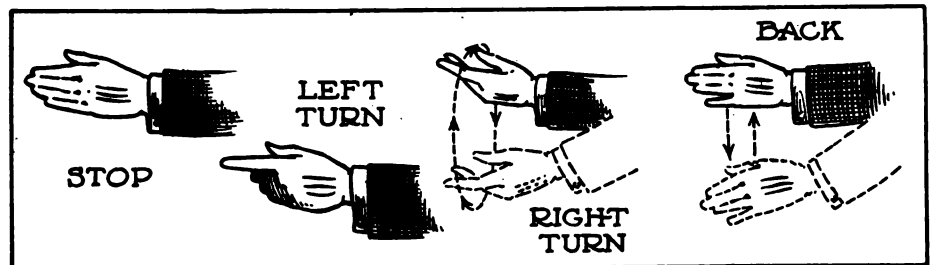
**LEFT TURN:** Extend the left arm and hold it stationary, with the index finger pointing and the outer three fingers closed.

**RIGHT TURN:** Extend the left arm with the fingers extended and the palm upward and rotate it from the rear to the front.

**BACK:** Extend the left arm with the fingers open and close together and the palm vertical, and move it upward and downward from a horizontal position.

**TURNING:** Give the "Left Turn" signal and repeat it until the vehicle has been turned and can be driven directly ahead. When turning always drive forward and turn into and with the traffic moving in the direction opposite to line of original movement.

The arm of the driver should always be extended full length and held a sufficient length of time to justify observa-



The Code of Hand Signals for Power Vehicle Drivers Approved by Massachusetts and Connecticut to Simplify Day Driving.

unknown or may be misunderstood.

According to Mr. Goodwin the signals, while not perhaps the best that could be devised, are intensely practical and conform to those accepted in Connecticut. Massachusetts and Connecticut have the largest number of vehicles of the six New England states, and with these two commonwealths approving the code there is reason to believe that the other states will approve them.

The Massachusetts Safe Roads Federation plans to have posters printed that will define each of the signals and distribute these to all garages, shops and other places where they may be conspicuously displayed, with the belief that in a comparatively short time they will be adopted and used and understood by drivers. The federation has numerous branches in all parts of the state and it is growing rapidly.

Because of the large number of drivers from other states who enter New England, and particularly Massachusetts and Connecticut, the hand code is illustrated and described. There is reason to believe that the code may be adopted in other states, and that it will eventually lead to better signaling, using the horn, for instance, during the hours when hand

tion of the drivers following.

The reader will note that the signal to stop is what has been very generally accepted for both turning and stopping, and there is little probability of confusion or accident in the event of the driver making the signal not being precisely understood.

#### WIRELESS TELEPHONE FOR AUTOMOBILES.

A compact wireless telephone set operated with current from the batteries of an automobile and transmitting and receiving over an aerial wire stretched from the top of the windshield to the radiator cap is the latest equipment provided for the modern motor car or truck. It is one of the new developments introduced at the 1920 Electrical Exposition recently held in Grand Central Palace, New York.

This apparatus, exclusive of the batteries and aerial wire, is contained in a box a cubic foot in size and the weight complete is 60 pounds. The price of a double set, one carried on the automobile and the other set up at home or at the office, is \$350. It was exhibited at the electrical exposition by the De Forest Radio Telephone and Telegraph Co.

## Mechanical Hints for the Car Owner

### IGNITION TESTING BY THE USE OF DRY CELLS.

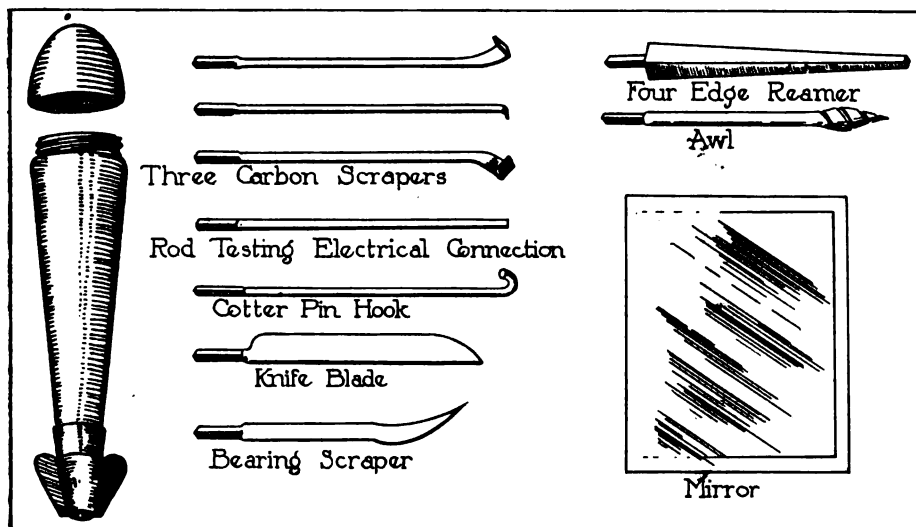
To test the ignition by a set of dry cells, first switch off, by placing the switch lever in a vertical position. Pull up the starting crank slowly until considerable resistance is met with—the resistance of compression. Free the starting crank gently, so as not to let the cranksaft move, and then throw on the switch on the battery side. If everything is in order one of the coil units will be heard buzzing. Electrical contact is made at the commutator every time one of the pistons reaches the firing point in the cylinder. This is secured by the timing of the engine. The coil vibrator will continue to buzz till the starting crank is turned to the next cylinder, or until the switch is thrown off. This buzzing sound is an indication that the vibrator of that particular coil is working properly. When the coil that is vibrating has been located the other three may be tested by putting

touches the metal of the engine. Attach the cable and throw the switch on. If the plug is working properly a succession of sparks should be seen between the points of the plug. The same cable can be used to test the other plugs by removing them one at a time and connecting to it. Always throw off the switch before attempting to handle or change the plug or the cable, otherwise there is liability of the operator receiving a violent high-tension shock.

If at any time it is suspected that the magneto is not developing sufficient current for the ignition, switch on to the battery, and if the engine runs perfectly, having previously given trouble, it may be intimated that the magneto, its cable, terminal plug, or switch connection is loose or out of order.

### HANDY TOOL SET FOR MOTORIST.

An admirable tool set for the motorist, which can be carried in small space, is



Handy Tool Set for Motorists Which Can Be Carried in Small Space.

them, one at a time, into the position of the buzzing unit.

The coil vibrators may be roughly adjusted with the dry cell battery, but it is not advisable to use the battery for the final test, as the setting of the vibrators should be made much lighter for magneto ignition, and if adjusted for the battery they would be under too high tension. A heavy tension on the magneto circuit causes rapid destruction of the vibrator points. Therefore, if the points are adjusted roughly by means of the battery, the final adjustments should be made with the magneto in the circuit and the engine running.

The spark plugs can be easily tested by means of the battery circuit, by locating a unit which gives indication of being in good order by the buzzing as described above, and tracing the high-tension (thick) cable from the rear of the coil to the plug. Switch off the current, remove the plug from the cylinder and lay it on the top of the engine in such a manner that only the metal of the lower part of the plug, or shell as it is called,

shown. It consists of 11 tools and an adjustable handle, such as is sold by hardware stores for home use, that can be used with all the tools except the mirror. This handle is provided with a wing nut, which tightens the chuck in the end against the tool and holds it securely while the tool is being used. The set comprises three flexible carbon scrapers, one small mirror for inspecting places where it is impossible to see otherwise, one rod for testing electrical connections and shorting spark plugs, a hook for removing cotter pins, a knife blade for cutting and cleaning electric wires, a small bearing scraper, a four-edged reamer, and an awl.

### VACUUM TANK FAILURE.

When the vacuum tank fails on the road it is possible to get up enough pressure temporarily to feed the fuel by blowing in the main line. By repeating this process every quarter of a mile enough fuel will be fed to get the car to a garage where repairs can be made.

### MANY KINDS OF KNOCKS.

One of the most irritating things to a motorist is a knock somewhere in the car. It is stated on good authority that there are at least 57 varieties of knocks. Some knocks are so baffling to locate and remedy as to give unceasing trouble even to the experts of the garage and service station. But with care the owner of average intelligence may find and eliminate the ordinary causes.

Perhaps the most frequent kind is that which comes from carbon deposits in the combustion chambers of the engine. With fuel, such as the motorist is compelled to buy at the present time, there is every chance for carbon to accumulate. Faulty carburetion, poor lubricant and poor compression do produce it, and many engines, even in high-grade cars, have a proneness to accumulate carbon. Most high-powered engines are constructed for as high compression as possible; in fact this is carried almost to the point of pre-ignition. Then, when a film of carbon forms in the combustion chamber, it raises the compression so there is pre-ignition and consequently a knock.

One should not jump to the conclusion, however, that every knock is caused by carbon deposits in the engine. Not all knocks are damaging to the engine, but some of their causes, such as a loose connecting rod bearing, a loose cylinder, lack of lubrication, or a broken moving part, might prove immediately injurious. It is better to take no chances and it is well to determine what is at fault at once. Shut down the engine until you are sure that none of the causes just mentioned is responsible for the noise. But a piston slap, though noisy, or a clicking oil pump will not cause serious damage to the engine.

### EMERGENCY REPAIR OF RIM CUTS.

Rim cuts are often given up as hopeless by the motorist, but they can be repaired in an emergency in the following manner: Drill or punch a series of holes on each side of the break at intervals of  $\frac{3}{8}$  of an inch and far enough from the edge so that they will not pull out. Lace the holes with a cord made of six strands of braided fish line or any braided cord about  $\frac{3}{32}$  of an inch in diameter. Soak this lacing in paraffine or wax to make it water proof, then thread it through the first hole, wind it around the bead, through the second hole and so on. Let six inches of the cord hang over on each end for tucking away. Finally place a blow-out patch over the lacing inside the shoe to protect the tube against injury.

### USING A WRENCH.

A monkey wrench should never be drawn backward from the jaws, as this movement is likely to bend the bar. The wrench should always be pulled toward the jaws.

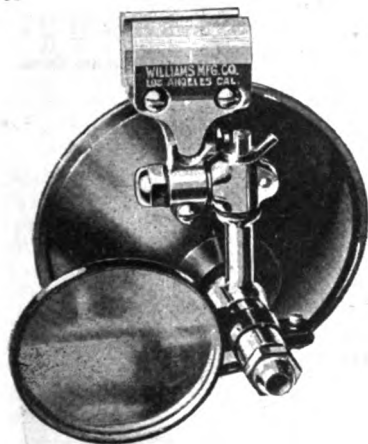


# ACCESSORIES DEPARTMENT

The Williams Combination Spot Light and Trouble Light offers to the motorist a combination which the manufacturer claims is unexcelled for its purpose. High grade material is used throughout in its construction, while all metal parts pass through several annealing and spinning processes which give the metal a uniform thickness and compactness, thus affording a better finished surface. All



bright parts are heavily nickel plated before the enamel is applied, while the enamel is put on with an air brush to secure uniformity and is then baked in an oven at 400 degrees Fahrenheit, resulting in a hard, durable finish. No spot light with soldered parts could possibly stand so intense a heat, the manufacturer states.



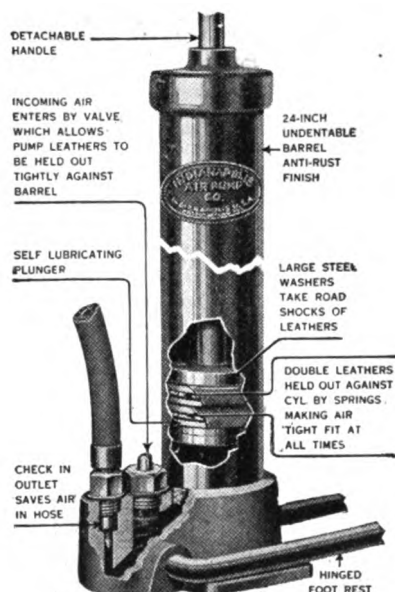
Williams spot lights are guaranteed unqualifiedly at the time of sale and the manufacturer will make good any defect in the lamp or its parts.

Manufactured by Hughson & Merton, Inc., 56 East Randolph Street, Chicago, Ill., and 77 O'Farrell Street, San Francisco, Cal. Prices on request.

The Indianapolis Guaranteed Pump embodies many special features in its construction which place it in a separate class from other high grade air force

pumps. The cylinder of the pump is made of 18-gauge (1/16 inch) steel, and is claimed to be dent proof, even under abuse. The finish of the barrel is either a highly polished nickel or an equally highly polished, chip-proof, baked enamel.

The pump plunger is fitted with two leathers, each provided with a machine turned washer and expansion spring which at all times hold the leather snugly against the inner surface of the barrel or cylinder. The incoming air, instead of being taken in at the top of the barrel as is customary, enters through a spe-



**FIVE-YEAR TIRE PUMP INSURANCE**  
THE ONLY ATTENTION NECESSARY  
ONE-ONLY-DROP OF OIL AT  
AIR INLET VALVE OCCASIONALLY  
**A FIVE-YEAR GUARANTEE**

cial valve provided for the purpose in the base. The valve, being automatic in action, also prevents the air from leaking out. A check valve is located at the air outlet, where the air passes into the hose to the tire, which is also automatic in action. It is stated that the pump is very easy to operate on account of the improved principle employed in its construction, and that tires of varying sizes can be inflated in a few minutes time with a minimum of effort.

Manufactured by the Indianapolis Air Pump Co., 1625 Bell Street, Indianapolis, Ind. Price, \$4.

The Pee Gee Auto Painting Outfit is claimed to make it possible for the motorist to purchase at small cost the necessary enamel, varnish and top dressing to refinish the average small car at nominal cost so that by following the complete instructions given, which are very

simple and easily understood, he may refinish his car in a few hours time and be able to use it the next day without danger of marring the new finish.

The outfit is packed in a neat cardboard container with each article plainly marked and includes a brush for applying the paint, one quart Auto flat black, one quart Auto gloss black, one quart Auto

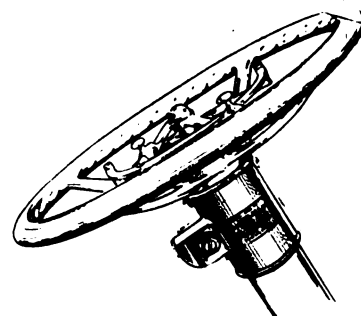


top dressing, one-quarter of a dozen sheets No. 1 and No. 00 sandpaper each and one two-inch all Chinese bristle varnish brush.

Manufactured by Peaslee-Gaubert, Louisville, Ky. Price of outfit, complete, \$5. Dealer and jobber trade solicited.

Karlok Thief-Proof Lock for Automobiles was designed to obviate the stealing of automobiles, the manufacturer stating that he has perfected a lock that cannot be picked and that provides certain assurance of protection from theft.

The device is attached to the steering post of the car and the underside of the wheel hub is equipped with a Yale lock which is easily locked and unlocked, and will prevent anyone from moving the car in any direction other than a straight line,



as the wheels are set in a straight ahead position when the Karlok is attached. In case of fire the car can be rolled ahead out of danger.

Manufactured by the Russell Sales Co., Newark, N. J. Price \$15. Literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The La France Fire Extinguisher No. 3** is designed to give the motorist, who carries the extinguisher in his car and the service station owner who provides fire protection in his station the best means of handling and putting out small fires at the start. It has been developed, it is stated, with the aim of giving instantaneous and rapid action from the first pull to the last push of the handle. It throws a solid, steady stream from 30 to 40 feet. The pump mechanism is so constructed

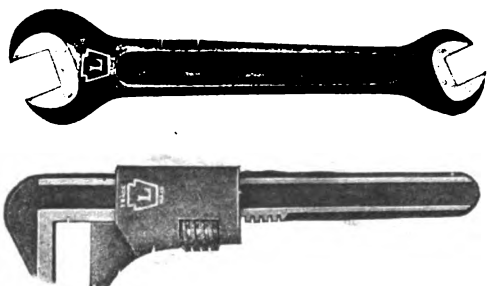


that it requires no solid joints and as a result it is claimed that there is no part which can be affected by corrosion which results from the action of the carbon tetrachloride solution on the acid flux used in soldering. It is further stated that accidental dents in the walls of the shell will not affect the perfect working of the extinguisher.

Manufactured by the American-La France Fire Engine Co., Inc., Elmira, N. Y. Price with auto or wall bracket complete, \$12. A handsome glass wall case can be supplied at \$2 extra. The La France solution sells for \$1.50 a quart, or \$25 for five gallons.

**The Lakeside Drop Forged Wrenches** are entirely new in design and every detail of their construction, it is stated, has been carefully worked out. For strength, workmanship, quality of material, appearance and general utility, they are said to be unsurpassed.

All finished wrenches are milled to size and case hardened all over, polished and highly finished with bright heads lacquered. The semi-finished wrenches are milled to size and case hardened all over



with polished heads, while the unfinished wrenches are the forgings milled only. All wrenches, unless otherwise ordered, are milled for United States standard nuts and bolts. A special line of heavy wrenches for United States standard nuts are also made and these will be found

very desirable for heavy work.

Manufactured by the Lakeside Forge Co., Erie, Pa. Prices and literature on request.

**Liquid Stoppit** is a solution especially designed to stop leaks in radiators which, after considerable experimenting on the part of the manufacturer is stated to be very superior for this class of work; is absolutely harmless and cannot injure radiator, hose connections or cooling system, and that it includes no glue, flaxseed or meal.

It is claimed that Liquid Stoppit will search out every leak in the radiator and

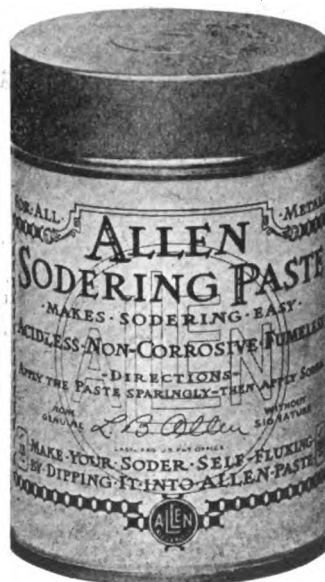


will seal it permanently, the work being done in a more efficient manner than by the old method of soldering, and at a fraction of the time and expense.

Liquid Stoppit is stated to be especially efficient in the case of a new radiator, in that filling it with the solution and allowing it to stay for a time will tend to keep the inside from rusting.

Manufactured by Cummings Brothers, Flint, Mich. Sold in pint cans only for all cars. Price, 75 cents each.

**Allen's Soldering Paste** is one of the many products put on the market, under this trade name, especially designed for this class of repair work on motor vehicles. This is the same material as offered in sticks, but is softened into a paste form for ease in application, and adheres to the surface while soldering is being done. It is put up in collapsible tubes, with non-tapering aluminum nozzles that feed the paste on to the work in a thin ribbon; also in two, four and eight-ounce and one and five-pound cans and 50-pound pails. The soldering mate-



rial is made self-fluxing by dipping it in Allen paste.

Other articles of the same class made by the same company are Alumni-Flux, Alumni-Solder, Alumni-Weld Flux, Non-

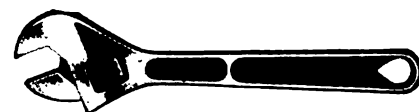
(When Writing to Advertisers, Please Mention the Automobile Journal.)

**Acid Soldering Fluxes, Soldering Stick, Soldering Salts, Soldering Liquid, Allen Fountain Pen for liquid fluxes and Allen's Commutator Lubricant.**

All these goods are claimed to be convenient and economical, and are free of poisonous acid fumes when in use. Each article is accompanied by full directions for its use.

Made by the L. B. Allen Co., Inc., 4521 North Lincoln Street, Chicago, Ill. Prices and literature supplied at request.

**The Barcolo Model N Wrench** has been developed after much experimenting on the part of the manufacturer and engineers to supply a wrench that would combine ease of operation and toughness to a large degree. The manufacturer states that these qualities are found in the Model N wrench and that, from all angles of use, it is a superior tool. The



wrench is of the adjustable type and is operated by a knurled nut, which opens and closes one jaw, the other jaw being stationary and forming a continuation of the handle. It is constructed on a 22½-degree angle and will fit standard hex and square nuts within its size.

Manufactured by the Barcolo Manufacturing Co., Buffalo, N. Y. Prices on request.

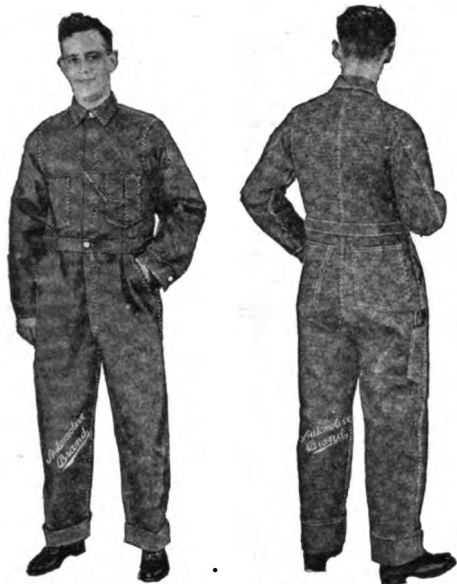
**The Newsom Snap Lox Dust Cap** fits any automobile tire valve by simply being snapped over the stem of the valve and fastened to the bushing on the rim. It consists of two parts, the bushing that screws down on the valve stem and holds the stem in place and the cap that snaps down and locks. To remove the cap it is only necessary to grasp it between the



thumb and finger and draw it upward. This releases the lock and the cap comes off. The caps fit all standard makes of tire valves, the manufacturer states, and adds to the general appearance of the car.

Sold by the R. T. Sales Co., 3347 West Madison Street, Chicago, Ill. Prices and literature on request.

**Automotive Brand Overalls** are made especially for the service station and machine shop worker and garage repairer and mechanic. They are constructed in one piece form and are said to combine unusual wearing qualities with comfort. Pockets are fitted at convenient places, allowing the repairer to carry necessary small tools besides his personal belongings. The Automotive brand over-

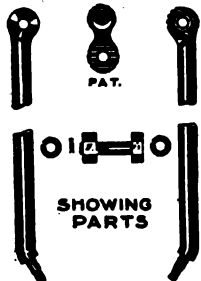


hauls are fitted with a belt at the middle, which proves a good feature, the manufacturer states, as it cuts down the danger of the workman getting his clothes caught in moving machinery.

Seven pockets are provided in these garments, two side and two hip, and a rule pocket in the pants and two breast pockets in the blouse, while they are finished with a neat turned down collar of the close buttoned type at the top.

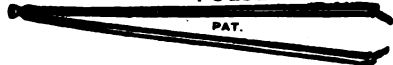
Manufactured by the Ohio Garment Co., Automotive Department, Springfield, O. Price on request.

**Bridge's Patented Three-Piece Radius Rods for Ford Cars** are designed, as the name implies, to replace a broken radius rod. They are constructed in three pieces,

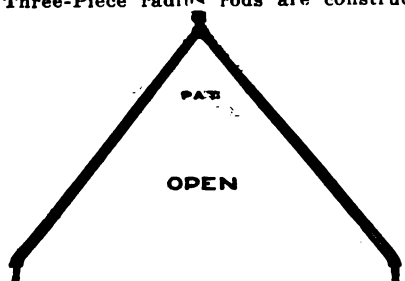


which can be folded and stored in the car till wanted. Only a few minutes time is required to remove the old rod and substitute the new three-piece rod, and it is

FOLDED



not necessary to lay up the car, or even drive to a garage, unless the motorist desires a repair man to put in the new rod. Three-Piece radius rods are construct-



(When Writing to Advertisers, Please Mention the Automobile Journal.)

ed in such a manner, the manufacturer states, as to give them the greatest strength possible, and to hold up under the severest usage. They are made in two styles, one for the 1919 car and previous models, and the other for the 1930 model.

Manufactured by the J. D. Bridges Co., Florence, S. C. Price, complete, \$3.75.

**The Invincible Acid Apron** has been developed after much thought and experimenting on the part of the manufacturer to secure a product which would fill the demand for general purpose work around service stations handling battery work exclusively. As more or less acid is always present and the danger of spilling is great, it is necessary to have an apron that will protect the workmen's clothes and able to withstand the acid which would necessarily come in contact with the material. The Invincible apron, the manufacturer states, has met these conditions admirably, having been tested

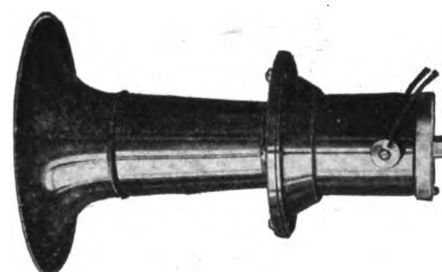


where they were subjected to rough usage, heat, acids, etc. The special fabric which has been developed for use in this apron has an extremely high resistive quality to all acids, giving an unusually long life under the worst conditions, but at the same time it is manufactured under such conditions that it can be put on the market at a very reasonable price, comparing very favorably with that of the ordinary rubber apron and lasting much longer, it is claimed.

Manufactured by the Defiance Welding Co., Defiance, O. Price and literature on request.

**The Samson Automobile Horn** has been designed to appeal to the discriminating buyer who wants the best obtainable for his money and is stated to embody in its construction those elements that go to make up a horn as nearly perfect as possible.

Samson horns are made in several different styles and are operated by an electrically driven motor which uses the six-volt current of the storage battery, and consumes but little energy, the manufacturer states. The Samson motor is powerfully built and employs a commutator



fitted with seven segments. All parts of the motor and horn are stated to be constructed of the highest grade material obtainable and are assembled by skilled mechanics who do nothing else but this class of work.

The copper gauze brushes are claimed to be self-adjusting and the field coils are properly insulated and are taped with

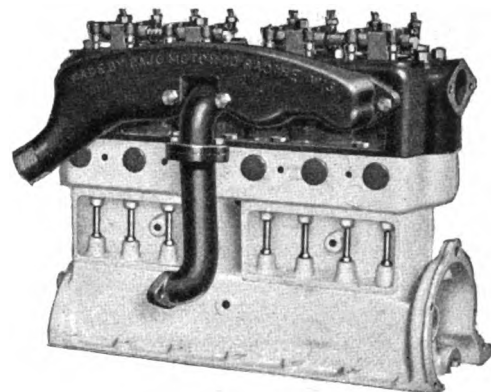
linen to resist the entrance of moisture.

This company also manufactures a line of hand-operated horns which are stated to be second to none on the market.

Manufactured by the American Electric Co., State and 64th Streets, Englewood Station, Chicago, Ill. Prices and literature on request.

**The Rajo Model 30, Valve-in-Head** is designed to replace the regular engine head on either the Ford passenger car or truck, enabling the Ford engine to develop, it is stated, better than 32 horsepower, thus enabling the Ford car to reach a speed of 50 or 60 miles an hour if desired.

The device is equipped with a larger water carrying space in the head jacket, while the exhaust pipe is made in one piece and contains a by-pass and pipe, which carries the hot gases from the exhaust to a jacket on the intake manifold and preheats the gas before it enters the combustion chambers. The valves are of large size and are made of tungsten



steel, carefully machined, are practically unbreakable and insure long life. The push rods are of cold rolled steel, fitted with a hardened steel concave head, which retains the oil and greatly lessens the wear and friction.

It is claimed that the power of the Ford engine is increased between 30 and 40 per cent. when using a Rajo equipment with valves in the head and that the gasoline consumption runs considerably less than the amount ordinarily consumed.

Manufactured by the Rajo Motor Co., Racine, Wis. Price and literature on request.

**The Burnley Soldering Paste** has been developed after considerable experimentation on the part of the manufacturer to find a suitable paste that would be efficient for all-around soldering work, more especially for radiator repairs and general work in the service station.

The manufacturer states that Burnley's soldering paste is the best flux that it is possible to obtain, that it needs no preparation for use and that it does not flow from the soldering line, but follows the heat of the iron, insuring a free, even

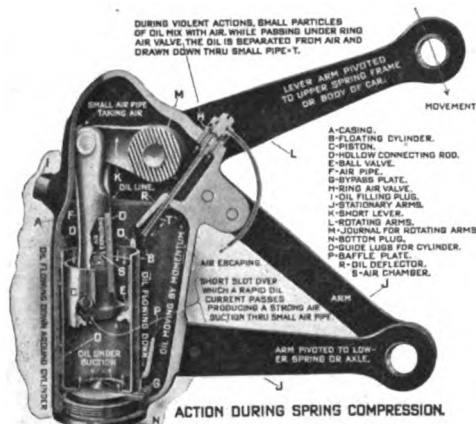


flow of the solder.

Other articles manufactured include soldering salts and a specially prepared soldering stick which combines solder and flux in the one article.

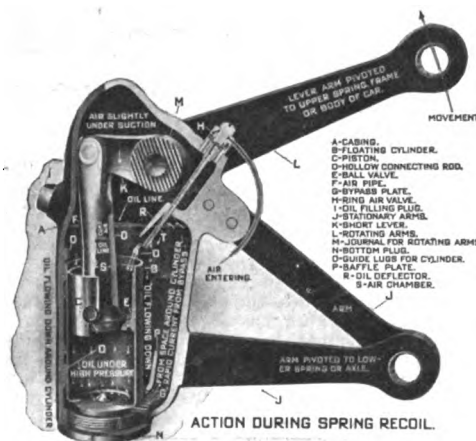
Manufactured by the Burnley Battery & Manufacturing Co., North East, Pa. Prices and literature on application. Repair men are invited to send for samples of these articles.

The Landis Shock Diffuser differs from most of the so-called shock absorbers in the fact that instead of using coiled springs to take up and absorb the road shocks, use is made of a container, partially filled with oil, which is acted upon by a piston. A cushioning effect is gained through the admission of air which is later compressed within the diffuser and acts as a buffer.



The diffuser is fastened to the car chassis by means of three arms; two are fastened to the axle and one to the frame. The action of the springs when driving over uneven road surfaces causes the arms, which are fastened to the axle, to actuate the piston, this in turn compressing the oil below, thus cushioning the shock, while the upward rebound is snubbed by the compression of the air above the piston shortening its distance of travel.

Provision is made for any excess of oil in the base to pass into an enlarged chamber at the side as it is thrown upwards by the action of the piston during the period of compression, and, when the compression is released, the oil again returns to the bottom of the container. A grate having small openings is provided at the bottom of the oil container, which



regulates the flow of oil, when under compression, and prevents the piston from losing its compression effect too rapidly.

The Landis Shock Diffuser is claimed to be an unusually high grade device and is being placed on a number of the larger, higher priced cars. It is further stated that cars so equipped are practically free from the annoyance of shocks and vibration due to uneven road surfaces.

Manufactured by the Landis Engineering & Manufacturing Co., Waynesboro, Pa. Prices and literature on request.

The Sunbeam Search Light is stated to be a very desirable spot light of exceptional illuminating possibilities. It is so constructed as to be easily attached or detached for use when locating and remedying troubles of all kinds about the

car. The focussing device is so arranged as to produce a large or small beam on the road as best meets the needs of the motorist. The light is fitted with a silver plated convex lens and highly polished reflectors and uses six-eight volt, 21 candlepower nitrogen bulbs. The back of the light container is finished in black



enamel and all parts are highly finished, while an excellent regulating attachment is included which is stated to comply with the law.

Manufactured by the Sunbeam Manufacturing Co., Inc., Seattle, Wash. Prices and literature on request.

The B-G Spark Plugs were developed during the war for aviation purposes and the manufacturer states that they did such good work under these conditions that they have decided to use the principles employed to make a component suitable for passenger cars, trucks and tractors.

The self-cleaning feature of the B. G. plug is based on the sudden changing of the direction of gases or air in which small globules of oil are suspended. The oil will continue in the initial direction,



while the gases will make the change of direction. This fact is used in the construction of the interior of the B-G plug in the shape of a small oil pocket in the lower cavity of the plug, formed by the construction of the body of the plug. All holes or inlets into the plug are shaped to direct the incoming gases and oil globules into this pocket, where the oil will be separated and held suspended until the spark jumps between the sparking points, causing an explosion of the gases in the combustion chamber and in the interior of the plugs.

The combined area of all the openings in the end of the plug is sufficient to per-

mit the interior of the plug to fill with pressure nearly equal to that accumulated in the compression chamber of the cylinder on a compression stroke of the piston. This causes a tremendous blast to pass between the sparking points at the exact time that the ignition current jumps the gap between the sparking points, thus assuring clean sparking points at the most essential moment. The interior of the plug is so constructed that when the gases are ignited and pass out from the plug into the combustion chamber of the cylinder they are all directed by the interior construction of the plug, between the sparking points, thus blasting or blowing any carbon or oil that may have accumulated in the chambers of the plug into the combustion chambers of the cylinder.

Manufactured by the Brewster-Goldsmith Corporation, 33 Gold Street, New York City. Prices and literature on request.

The Brookins Thief-Proof Tire Lock is designed with the end in view to making it next to impossible for a thief to steal an automobile tire from the tire hanger of a passenger car. The links from which the chain is made are electrically welded from specially heat treated and chilled, non-corrosive steel which, it is claimed, cannot be cut by the strongest bolt cutters, neither can the links be pried apart.



A pure rubber tubing covers the chain to prevent rattling and to protect the enamel finish of the car.

With each chain is supplied a specially designed 24-tumbler lock with hardened shackle, it is stated, which cannot easily be cut. The lock is dust, rust and weather proof and is guaranteed by the manufacturers to be non-pickable, and is stated to bear the indorsement of the Underwriters' association.

Manufactured by the Brookins Manufacturing Co., Dayton, O., Department A. Price at all accessory dealers, \$4.50.

Packard Electric Cable has been manufactured for many years and is known throughout the trade as a product that can be relied upon, whether in high or low-tension work, to give the best of satisfaction. It is insulated with several



layers of pure Para rubber properly compounded to give maximum dielectric and mechanical strength. The rubber insulation is protected by two heavy braids impregnated with Packard special formula enamel which is proof against deterioration from heat, grease, oil, gasoline and vibration, the manufacturer states.

Packard cable has a characteristic seal brown color with two red stripings running spirally in opposite directions. The true Packard cable is supplied in coils of 100 feet or more, neatly wrapped and tagged.

Manufactured by the Packard Electric Co., Warren, O. Literature and prices on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



## FORD STARTING AND LIGHTING SYSTEM

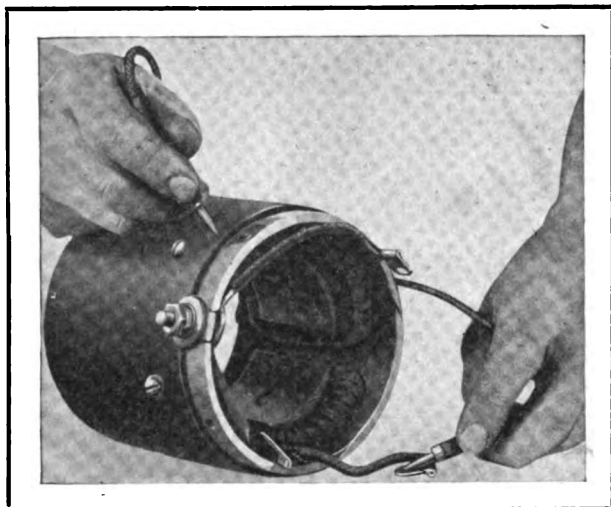


Figure 17, Testing Field Coils for Grounds.

(Continued from October Issue.)

The armature shaft should now be entered into the front end bracket and forced into it by dropping the commutator end of the shaft on to a block. After wiping out the yoke and brush holder bracket with a clean rag and making sure that all brushes are in a raised position, insert the armature through the yoke. Before forcing the front end bracket into the yoke it should be positioned so that the chamber will be to the right as you face the generator, the terminal post being up.

As the bracket usually fits snugly into the yoke, it is advisable to line up the bracket to the yoke screw holes carefully before driving the parts together. When they have been properly fitted, secure them with two opposite screws, making sure there is a lock washer under the head of each.

Try the shaft for end play by grasping the gear end, pushing it and drawing it out. If it shows more than  $1/32$  inch play, tighten with punch. One light tap of the hammer is usually sufficient. See that the armature turns freely in the yoke. If it does, let down the brushes and try running the generator with battery current, making it function as a motor. It is always good practise to reset the brushes on the neutral point.

If a new armature is installed, it is usually necessary to reseat brushes, otherwise a 75 per cent. fit will not be obtained. Finally, fit and pin the gear on to the shaft and assemble the generator on the engine, making sure that the gasket is in place on the gear case. Make all the connections from the generator to cut out, to battery, to ground, after which set the third brush so that a

current from 10 to 12 amperes is generated, attach the dust cover to the brush end bracket and fasten with screw on edge of cover.

### The Yoke.

The yoke should be inspected to see that the insulation has not been broken, particularly on the leads which are attached to the brush holder. Try the pole pieces with the fingers to insure that they are tight. Test the coils to see that they are not grounded, by holding one cord from the test lamp on the lead terminal and the other on the metal yoke, Figure 18. If the light shows there is a ground the yoke should be exchanged for a new one. Next try the coils for an open circuit by touching one end of the lamp cord to each of the terminal leads so that the current for the lamp must pass through the field coil, as shown in Figure 18. If the lamp lights the circuit is complete; if not, it is open, and unless the wires are broken at some point where they may be readily soldered together, the yoke should be exchanged. As a special fixture is necessary to line up the pole pieces, it is not advisable for the repairer to attempt to repair any of the coils when they become out of order. The yoke should, therefore, be returned to the manufacturer for repair.

### The Brush End Bracket.

The brush end bracket is attached to the yoke by means of four screws. As it is simply a stamping there is nothing which can go wrong unless it is knocked out of shape by some outside force. This condition will be noted by the armature rubbing on the pole pieces. If the bracket has been so damaged it should be replaced with a new one.

### Brush Holders and Supports.

Clamped to the brush end bracket by means

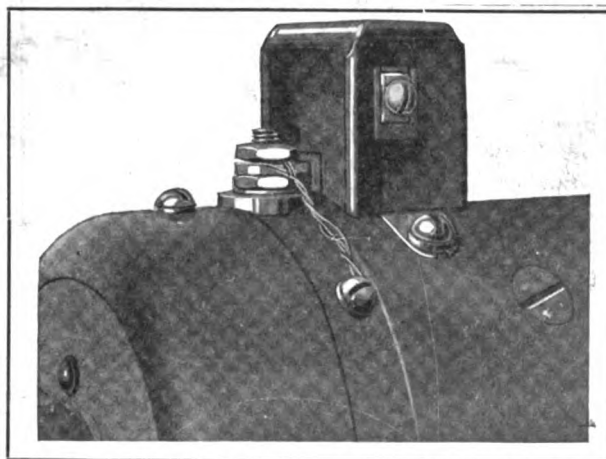


Figure 18, Grounding Cut-Out by Short-Circuiting, Preventing Damage to Generator.

### THE AUTOMATIC CUT-OUT.

of a ring and four screws which screw into a clamping ring is the brush holder support. There are four notches in the mortise of the support, which allow it to be moved back and forth to obtain the proper setting of the brushes. The third brush and the positive brush are insulated from the bracket by means of fiber pieces. Unless the fiber pieces are broken or warped, or the bracket holder bent, there is no need of replacing it. The brush holders should be inspected to see that they are tightly riveted to the support and that they are free from corrosion. See that the springs act properly on the brushes by raising the brush by means of the pig tail and dropping it again. It should drop back with a sharp click. If the brush fits tightly in the holder, file out the holder so that the brush fits properly.

#### The Automatic Cut-Out.

The cut-out is an electro-magnetic switch; it acts on the electric current the same as a check valve acts in a pipe line, that is, allows the current to flow in only one direction—from the generator to the battery. On the later cars the cut-out is located on top of the generator; while on earlier models it was located on the dash under the hood, and was grounded to the dash to the frame bracket.

The automatic cut-out consists of a fine wire coil and a heavier wire coil wound on a soft iron core. One end of the fine wire coil is attached to the wire leading from the generator, while the other is grounded to the generator yoke. One

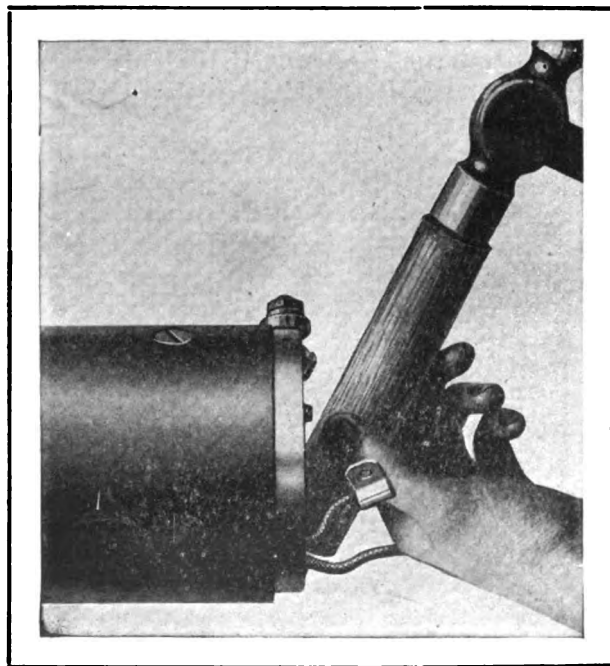
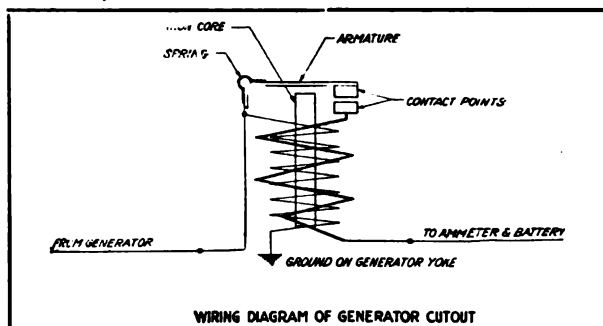


Figure 19, Pounding Down Projecting Field Windings, Preventing Them from Striking Armature.

end of the heavy wire coil is connected to the stationary contact point, while the other end leads to the ammeter-to-battery wire. The other con-



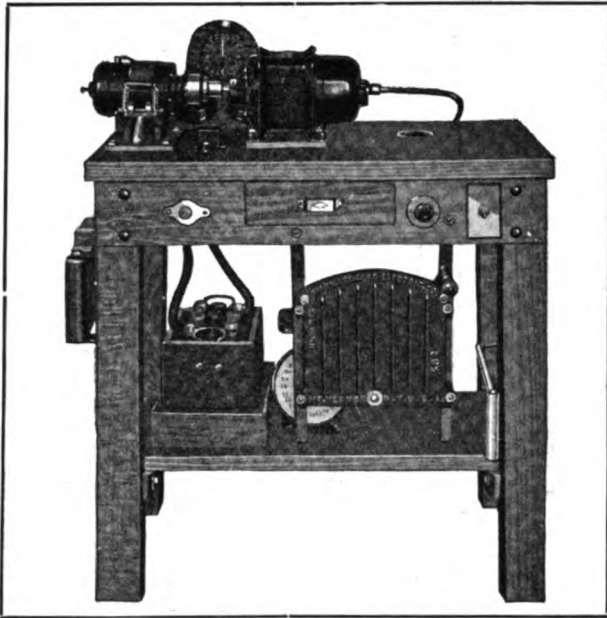
Wiring Diagram, Showing the Connections of the Generator Cut-Out.

tact point is located on a spring armature and is connected to the wire from the generator. When the engine is not running the contacts points are open. When the engine is started and the generator develops sufficient voltage, enough current passes through the fine wire coil to create sufficient magnetism to draw down the spring armature, closing the contact points. The current then passes through the contact points into the large wire coil and thence through the ammeter and battery. As the resistance is lower in the battery circuit than it is in the fine wire coil, practically all the current now passes through the battery, the large wire winding creating sufficient magnetism to hold the contact points together. When the engine slows down so that the voltage of the generator becomes less than the voltage of the battery, the direction of flow of the current is changed, and the magnetism becomes less and less, until it finally reaches zero. At this point the spring draws the points apart, and the flow of current from the battery stops.

The cut-out is set at the factory to cut in at about  $7\frac{1}{2}$  volts, and as this is a very important feature of the system, the cut-out should not be tampered with and, if out of order in any way, it should be replaced with a new one, the old one being sent to the manufacturer for credit.

Trouble in the cut-out is noted on the ammeter. If the instrument shows a discharge when the engine is not operating and the lights are turned on, remove the ammeter-to-the-switch wire and see if a discharge is still registered. If it is the trouble must lie in the cut-out. Start the engine and run it until a charge is registered. If the needle does not come back to zero when the engine has been shut off, the cut-out should be replaced. If the ammeter does not register "charge" when the engine is running, place a

## TESTS OF STARTING MOTOR.



Arrangement of Test Stand, Showing the Units Used for Testing Generators and Motors.

screw driver on the yoke of the generator and lean it against the terminal. If a good live spark occurs, replace the cut-out. **Never run the engine for any length of time when the ammeter does not register "charge" as the generator will be burned out, due to excessive current generated.**

If it is necessary to run the engine with a defective cut-out, attach a wire from the terminal to one of the screws on the dust cover or brush end bracket, as shown in Figure 19. **Never attach the wire to the cut-out, as this causes a fluttering of the points, causing them to pit and stick together.**

#### Starting Motor Tests and Repairs.

A ground or short circuit in the starting motor is indicated by its drawing an excessive amount of current and running comparatively slowly or not at all.

To take the motor apart, first raise the brushes, supporting them by means of the spring, as shown at Figure 14; take out the mounting bracket yoke screws, after which the bracket, together with the armature, may be withdrawn. The armature may next be drawn out of the mounting bracket.

#### The Armature.

The armature should be inspected in much the same manner as was explained in the generator section. However, it has one point of difference, to which special attention is called. The mica between the segments of the commutator is not undercut, as the brushes are sufficiently hard to

keep it worn smooth with the copper of the segments. If, however, the repairer finds that the mica is too high, he should cut it down, as was explained in the generator section. Besides the windings and commutator, the assembly should be inspected to see that the bearings on the shaft are smooth, not worn undersize.

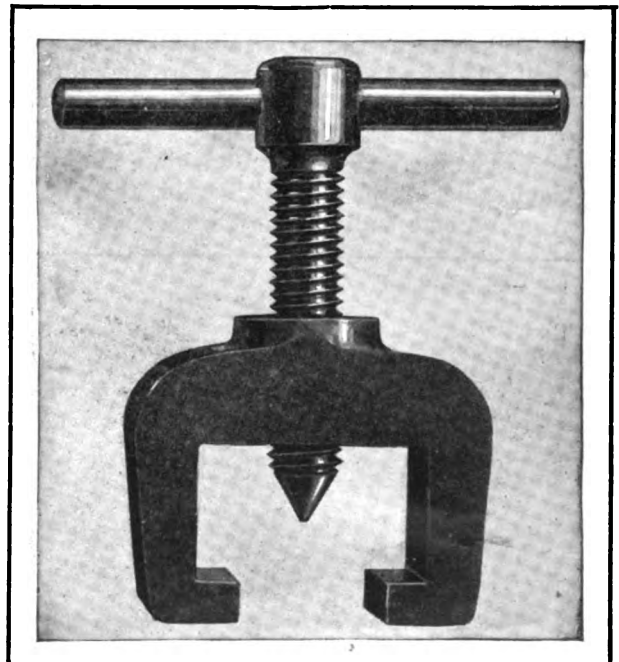
#### The Yoke.

The yoke should be tested in the same manner as the generator yoke. An open circuit, however, is always exposed and can be detected by visual inspection. If it is found that the armature is striking any of the extensions in the field windings they may be driven back into position by means of a wooden block and hammer, as shown in Figure 19.

#### The Brush Bracket Assembly.

The brush end bracket is similar to that of the generator, excepting that it houses a solid, self-lubricating bearing, which is pressed into it. About the only time it is necessary to replace this bearing is in the event of its freezing to the armature shaft, in which case it is removed with the shaft. If the bearing becomes oversized it may be turned out on a lathe or removed by driving a square drift into the hole, by means of which it may sometimes be twisted out.

As no brush holder adjustment is necessary on the motor, the brush holder support is riveted to the bracket. The two negative brush holders are riveted directly to the support while the two



Extractor Which May Be Used to Remove the Head of Bendix Drive if Stuck to Shaft.

### ASSEMBLING THE STARTING MOTOR.

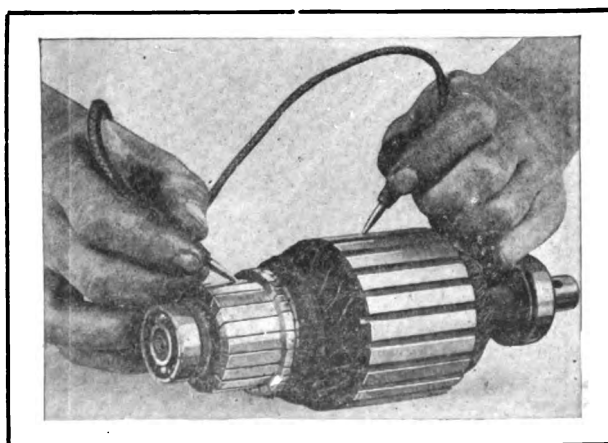
positive holders are insulated from it. These positive holders should be tested for a ground, as was explained in the article on the generator.

The brushes used on the motor are of a copper composition considerably harder than those used on the generator; furthermore, they are fitted with double pig tails and the two brushes are interchangeable.

They should be treated in the same manner as the generator brushes. As there is very little room between the brushes and the bracket, the repairer will find the use of sandpaper on an undersize commutator particularly advantageous on the starting motor.

#### The Mounting Bracket.

The mounting bracket is equipped with two brackets, one for the armature shaft, and the other for the end of the Bendix drive. The first is a bronze bushing, the second a babbitt bearing molded into the casting. There should be very little play between the bushing and the shaft, while 10 thousandths of an inch will do no harm between the babbitt bearing and the Bendix drive. The old style mounting brackets were equipped with a felt gasket and retainer to prevent an excess of oil working along the shaft on to the armature. On the new style this is prevented by increasing the length of the bearing and cutting an oil retaining groove in it. A hole drilled through the bracket, Figure 20, draws off any excess oil which might accumulate, another hole in the bottom of the yoke allowing it to run out. When replacing a bushing it is necessary to drill a hole in the bushing to correspond to the one in the bracket. If the bushing is installed in the old style bracket it is necessary to drill a hole in both the bracket and bushing, and also a  $\frac{1}{8}$  inch hole in the yoke. Should the babbitt bearing become badly worn it is necessary to re-



Testing for Grounds in Armature, Using Test Lamp.

turn the bracket to one of the Ford branches for rebabbitting.

#### Assembling the Motor.

In assembling the motor it is advisable to put a very little oil in the brush end bracket bearing

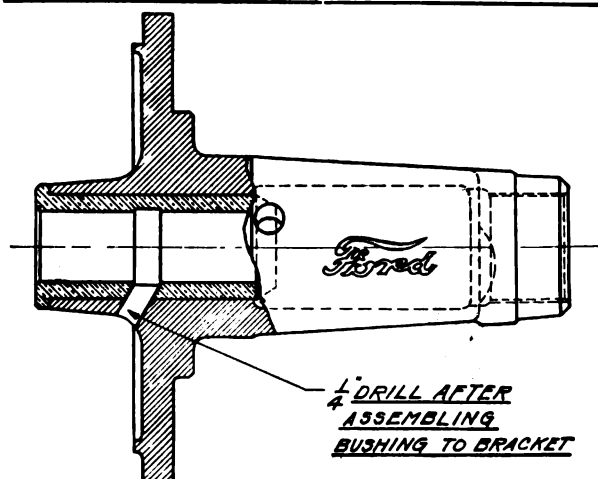


Figure 20, Starter Mounting Bracket, Showing Location of Oil Drain Hole.

to insure lubrication until the bearing finds itself. The mounting bracket, after a very little oil is spread on the brass bushing, is set over the armature shaft and forced well down on it. The armature is next inserted into the yoke and the mounting bracket is secured to the yoke by means of two screws. The bracket itself should be so positioned that the opening in it is to the right as you face the assembly when the terminal post is up. In this position the opening will be toward the flywheel when the motor is assembled in the engine. After this is done the motor may be tested by letting down the brushes, and running it with a battery current. If it runs correctly, try the fit of the Bendix drive. This is done by slipping the Bendix drive over the shaft and into the mounting bracket, Figure 21. It should slip into the bearing freely. If there is a slight bind it may be overcome by tapping the bracket with a rawhide mallet on the opposite side as shown in Figure 22. If it binds badly the screws should be loosened before tapping the bracket and, if it was not done before, the bracket and yoke should be inspected for dirt or a burr which would cause the assembly to be out of line.

If it is impossible to get the assembly to line up properly, it is necessary to install a new mounting bracket unless, when operating, the armature shaft runs out noticeably, showing that it is badly out of line, in which case a new armature should be installed or the shaft straight-



### INSTALLING THE MOTOR ON ENGINE.

ened. When the assembly checks up properly, run in the remainder of the bracket to the yoke screws, making sure there is a lock washer under the head of each, after which the motor should be given a final running test.

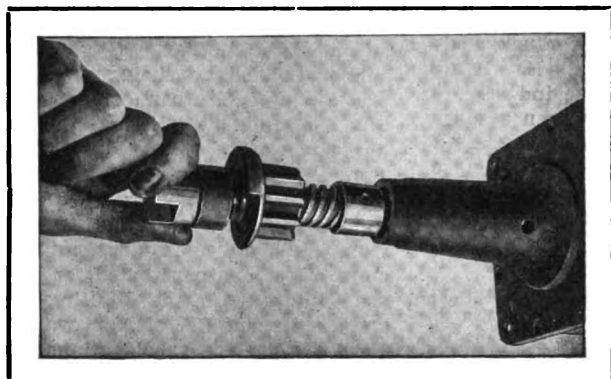


Figure 21, Fitting Bendix Drive to Starter Shaft.

If new brushes have been installed it will be necessary to run the motor for a period of 20 minutes to seat them properly, after which they should be examined and scraped if necessary. When the brushes show a good seat and the motor operates smoothly, drawing between 50 and 100 amperes, the dust cover may be secured and the motor is ready to be assembled to the engine.

It is well to warn the repairer again at this point against having the pig tails or any other part of the wiring in such a position that it will touch the dust cover, as this would surely result in a ground.

#### Assembling Starting Motor to Engine.

The first step in assembling the starting motor to the engine is to attach the unit to the gearset cover. Insert the shaft, with the mounting in such a position that the opening is toward the flywheel. At this point it is well to note whether or not the terminal is on top. If it is not the bracket should be removed and reassembled to the yoke, so that the above conditions will obtain. The motor is assembled with a gasket between it and the gearset, being secured with the

screws backed up by lock washers. The motor is now ready for the Bendix-drive assembly.

The Bendix drive is a mechanical device to engage and disengage the starting motor gear

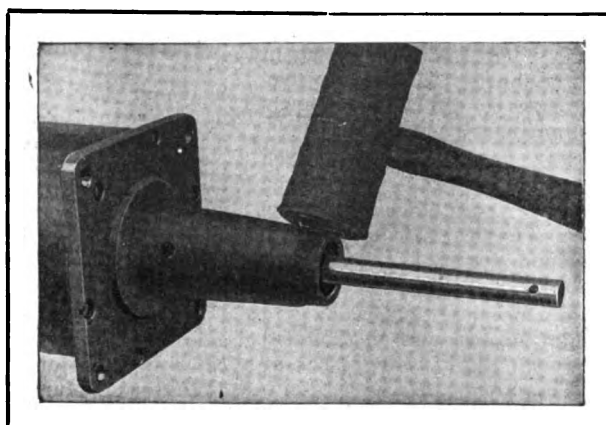


Figure 22, Method of Straightening Bracket if Bendix Drive Binds on Shaft.

with and from the ring gear on the flywheel, and also to absorb the initial shock of "breaking the engine loose." The armature shaft extends through the body of the Bendix drive, which may turn freely upon it until secured to the head by means of the coil spring. The Bendix drive head, shown at the left in Figure 23, is secured to the shaft by means of a Woodruff key and a set screw. There is a balance collar on the gear, which tends to stay below the shaft. This position of rest is obtained when the motor is not running and the gear is well out of mesh. When the driver steps on the starting switch, causing the motor armature to revolve, the inertia of the gear causes it to run along the threads until it is meshed with the ring gear, when it rests against the shoulder, in which position it remains until the switch is released or the engine starts operating under its own power; the Bendix drive being driven faster by the engine, runs back on the threads of the shaft out of mesh with the ring gear.

(To Be Continued.)

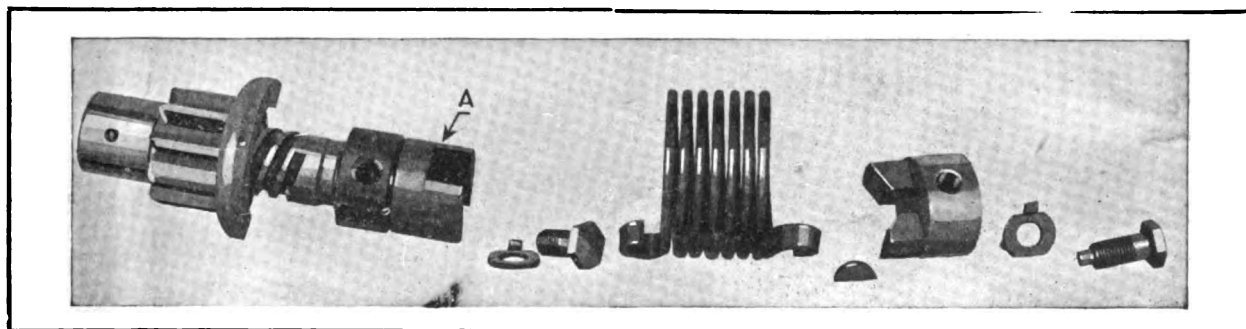


Figure 23, Bendix Drive Disassembled, Showing Parts in Order of Assembly.

# NOTES OF TRADE AND INDUSTRY

## Clark Equipment Co's New Axle Factory

The accompanying illustration shows the magnificent new plant which the Clark Equipment Co., Buchanan, Mich., is erecting at Battle Creek, Mich. This concern makes a complete line of internal gear drive truck axles, ranging in size from three-quarters of a ton to five-ton, and all sizes of steel disc wheels for solid and pneumatic truck tires.

Work on the new plant began March 1 and it will be entirely given over to the making of Clark motor axles and is designed to care for the anticipated increasing demand for this product for some time to come.

All sales, engineering, purchasing and general administration will be handled as before through the general offices at Buchanan. There will also be put into force at the Battle Creek plant the same progressive policies of plant management and profit sharing which have proved so valuable at Buchanan.

The plant's site comprises 23 acres, with a 4600-foot frontage on the main line of the Michigan Central railroad and a smaller frontage along the Grand Rapids and Interurban railroad. It is located on the extreme western side of the city. The manufacturing building is 99 feet by 440 feet and a warehouse parallel to it is 50 feet by 144 feet. The two buildings are connected by two closed passageways. A third building houses the power plant.

### WOLKE CO. TO SUPPLY OWN BOXES.

The Wolke Lead Batteries Co., Louisville, Ky., finding it advisable to manufacture battery boxes for its own use and for replacements to service stations, has just completed a large box factory which will be used for that purpose. The growing business of the company has made it imperative that a standard box in large quantities be at all times available, and the new structure, with its modern machinery and equipment, makes this possible.

### HAMILTON MOTORS ADDS DISTRICT SALES MANAGERS.

The Hamilton Motors Co., Grand Haven, Mich., manufacturer of Apex trucks, announces through General Sales Manager A. L. Martin, the following appointments:

H. H. Brown to have charge of the district comprising Western Missouri, Illinois, Indiana, Ohio and Kentucky, with headquarters at Chicago. Mr. Brown has been in the automotive industry for a number of years, having been associated with the McCord Radiator Co., and was assistant to the vice president of the Studebaker Corporation of America. He resigned the latter position to serve in France in the Motor Transport department. Upon his return he joined the Four Wheel Drive Auto Co. as district sales manager, from which position he came to the Hamilton Co.

Walter A. Murphy has been appointed district sales manager for Michigan, Wisconsin, Minnesota, Iowa, North and South Dakota, Kansas and Western Missouri, with headquarters at Chicago. He was formerly sales manager at Chicago of the Certaineed Products Co. and comes to his present position from that of special representative of the Four Wheel Drive Auto Co.

L. R. Hunter has been given charge of the territory of North and South Carolina, Georgia, Florida, Alabama and Mississippi, with headquarters at Atlanta. Mr. Hunter has been located for some time at the Hamilton Co.'s New York office.

### SEALED CARTONS FOR PISTON RING SHIPMENTS.

Acting upon the suggestion of its distributors and salesmen, the American Hammered Piston Ring Co., Baltimore, Md., has adopted the policy of sealing each carton of piston rings with an extra tape around the bottom of the box. The specially sealed carton, an innovation in packing piston rings, affords double protection to the product and insures the dealer against mix-ups in his stock.

## Southern Motors Contracts for Foundry

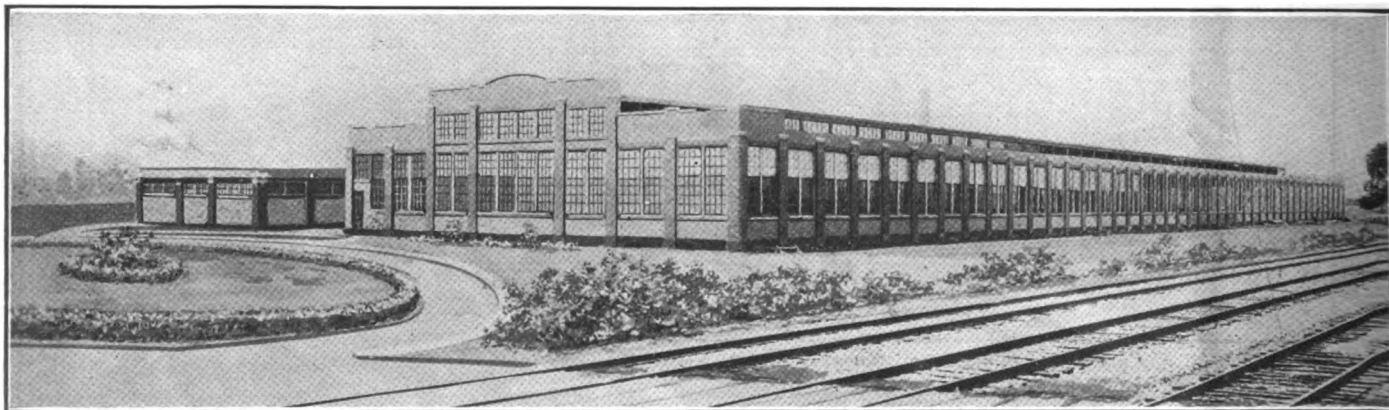
The Southern Motor Manufacturing Association, Ltd., expects by the first of the coming year to be producing its own malleable and gray iron for its various plants and products in the new \$60,000 foundry on the permanent Ranger plant site at Houston, Tex.

Preparations are being made for the erection of a Truscan company monitor type 3-m foundry building, the contract having been let to A. C. Munde, the Truscan erection engineer. Open hearth malleable annealing ovens, cupola for cast iron, core ovens, crane truck ladles, trolleys and all necessary foundry equipment have been contracted for by Southern Motors with the Whiting Foundry and Equipment Co. of Harvey, Ill.

All engineering specifications and data for the foundry have been completed and specifications and contracts submitted by the Ranger engineering department to President Jacques E. Blevins of Southern Motors and approved by him. Prompt delivery dates on the foundry materials have been promised by the Truscan company through its representative, B. H. Bain of the Dallas office, who says shipments will be made within the next 10 weeks. The foundry equipment is promised by the representative of the Whiting Co., G. P. Fisher, for delivery in 12 weeks.

### VALLEY ELECTRIC CO. MOVES INTO NEW QUARTERS.

The Valley Electric Co., St. Louis, Mo., which recently purchased the St. Louis Electrical Works, is moving into its new buildings on South Kingshighway, in which will be located the offices and automotive departments. All motor manufacturing is, for the present, still being done at the old plant, 4060 Forest Park boulevard, but this unit will eventually be devoted to the making of the larger sized motors, while the new plant will be used exclusively for the construction of the five-horsepower and smaller motors.



The Fine New Plant of the Clark Equipment Co., at Battle Creek, Mich., Which Is Nearing Completion and Will Be Used Exclusively for the Production of Truck Axles.

## New National Sextet Phaeton

One of the characteristics of the new National Sextet phaeton which is being brought out by the National Motor Car & Vehicle Corporation, Indianapolis, Ind., is that it is designed along lines which make it appear to hug the ground in the mode of the finest European cars, yet the standard road clearance is maintained. The unusually low effect has been secured through the exclusive method of body mounting followed by National, in which it is suspended on brackets riveted below the upper edge of the chassis frame, dropping the body sides several inches closer to the ground.

In the year that has followed the introduction of this method of body mounting, it has proved itself not only a source of beauty, but of riding comfort as well. Squeaks and rattles are banished through the increased rigidity of the body support, the sills being laid on edge, instead of flat, and overlapping the chassis frame.

An outstanding feature of the National Sextet phaeton is the cast aluminum steps replacing the conventional running boards.

### RECORD OF UNIVERSAL EQUIPPED FORD CAR.

The accompanying illustration shows the Ford car, equipped with a model C Universal body, made by the Universal Body Co., Mishawaka, Ind., in which Benjamin Craven and H. J. Koukel of New York city recently made the trip of 1100 miles from the Metropolis to the Indiana city in the remarkable time of 5½ days of daylight driving, and carrying over 400 pounds of baggage. This also included 200 miles of detours which is not included in the total mileage stated. The gasoline consumption was a little over 18 miles to the gallon. Only one tire change was necessary, this being occasioned by a blow-out sustained during an effort to avoid being struck by a five-ton truck.

The Universal body with which this car is fitted is four inches lower than the standard Ford, and disc wheels are used. The lengthened wheelbase, 20 inches, and a special equipment common to this design, which is known as Camper's model, permitted sleeping in

the car for all five nights, and the tourists reported that they were very comfortable. An examination of the body by expert mechanics on its arrival at the Universal body plant showed that it was not injured in the least by the long, hard drive over a great variety of road conditions.

George W. Craven, general manager of the Universal body plant, reports that production is being increased from day to day and that, by the first of the year it is expected that a minimum output of 50 bodies a day will be reached.

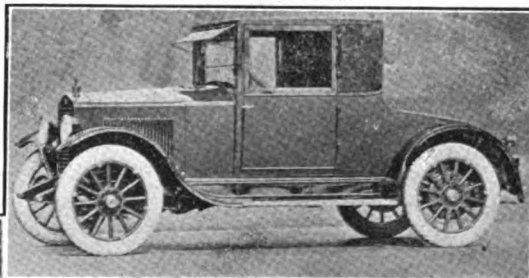
### BOSTON ATTORNEY BUYS AUCTIONEED AUTOS.

Seventy automobiles were bought by David Stoneman, a Boston attorney, recently for \$65,000, at an auction in the Federal Bankruptcy court of the property of the Massachusetts Motors commission. Mr. Stoneman's purchase was not for himself, but was made as agent for some unnamed buyer.

Because claims have been presented by the Commercial and Mutual Finance Corporations against the Massachusetts Motors Corporation the proceeds of this sale will be held by the trustees, Charles F. Rowley, George W. Reed and Thomas D. Lavelle, until the matter has been settled by the Federal District court.

### WELLS MOTOR CO.'S NEW SALES ROOM.

Situated in the heart of "Automobile Row," handsomely furnished and attractively laid out, the new home of the Wells Motor Co., 842 Commonwealth avenue, Boston, will compare favorably with the best in the city and A. L. Wells, local distributor for Premier cars, has good reason to feel proud. The entrance is on Dummer street, which is in the rear of the salesroom. Windows comprise the entire two sides of the service department, which permit abundance of light for working on a car in any part of the floor.



## Latest Addition to Essex Line

The latest addition to the Essex line, offered by Essex Motors, Inc., Detroit, Mich., is the two-passenger cabriolet, which is designed with especial regard for the comfort and convenience of its occupants.

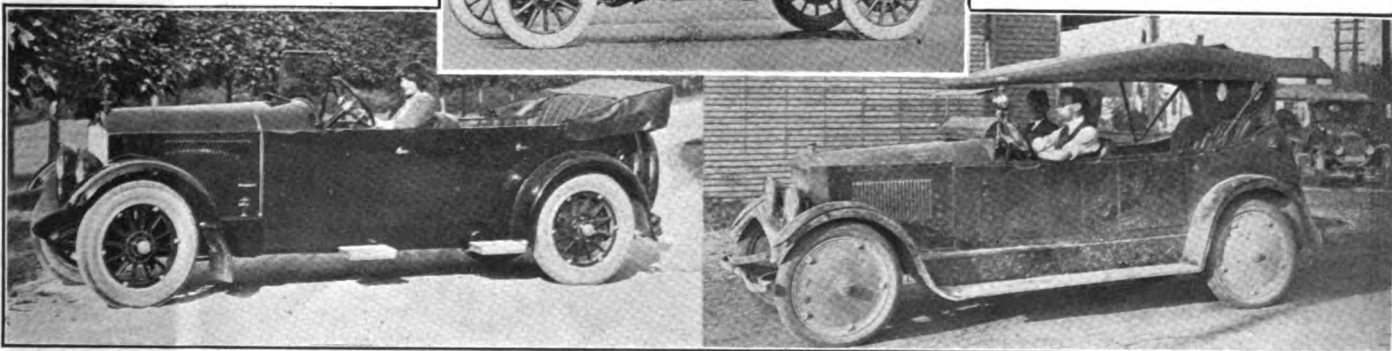
The pleasing straight lines that characterize all Essex models are carried out in the cabriolet. They emphasize the smartness and fleetness of the car. The top is low and the interior is roomy. The doors are exceptionally wide. They enable one to get in and out without the slightest effort, and the large windows admit a greater range of vision from either side.

The after-deck curves gracefully in harmony with the contour of the rear fenders. There is a patent leather sun visor, easily adjustable, which adds its bit to the smartness of the car. Above the narrow black moulding the body and top are covered with black grained leather. The color of the car otherwise is the standard Essex brewster green; the chassis and fenders are in black. The upholstery is of wool fabric in a rich tone of gray. The pockets, dome light, floor mat and the deep cushioning of the commodious seat are also worthy of special note.

The weight of the cabriolet body is so balanced as to give the utmost in riding comfort. The carrying space in the after deck may be used to the fullest advantage. The ordinary parcel or bag can be placed within the deck through the snugly fitting hinged trap door. The top of the rear deck may be removed entirely, if desired, for the carrying of trunks or other large, bulky articles.

### NEW ERA BUMPERS IN CANADA.

Smalley Daniels, president of the New Era Spring & Specialty Co., Grand Rapids, Mich., announces that he has given the Richards-Wilcox Canadian Company of London, Ontario, the sole license to manufacture and market New Era bumpers in Canada. It is understood that Richards-Wilcox of Canada will also make H. & D. shock absorbers and Perfection heaters for the Canadian trade.



Some Features of Recent New Passenger Car Models—Above, Essex Two-Passenger Cabriolet. Below, at Left, New National Sextet Phaeton; at Right, Ford Car, Equipped with Universal Body, at the Close of 1100-Mile Daylight Trip.

# Personal News of Industry and Trade

## Development of Cooper Battery

From a small company, capitalized at a few thousand dollars, to a \$3,000,000 corporation in less than 10 years is the remarkable record established by a concern in the automotive field, the I. J. Cooper Rubber Co., Cincinnati, O., now conceded to be one of the largest distributors of automobile tires and accessories in the country. The business of this company had its humble inception in a small store in Cincinnati, O., in September, 1911, with tires and tire sundries as its only distributing products.

In 1917 storage batteries and parts were added to the business, the Cooper storage battery was developed and production and distribution started.

The factory, starting with a capacity of 25 batteries, now has facilities for manufacturing 600 a day. At the present time over 1000 service stations represent the Cooper storage battery in the territory controlled by the I. J. Cooper Rubber Co.

In April, 1920, the Cooper Corporation was formed through the consolidation of the I. J. Cooper Rubber Co., the Cooper Storage Battery Manufacturing Co. and the Giant Tire & Rubber Co.

The success of this mammoth organization can be attributed to the far-sighted merchandising principles of its president, I. J. Cooper, and his associates, H. H. Brenner, general sales manager, and J. W. Brumbaugh, vice president.

R. F. Blackwell, well known in the automotive industry in Spokane, Wash., was made president of the Spokane Automobile Chamber of Commerce at a meeting held recently.

William B. Krueger of Lake Geneva, Wis., has purchased the share of Ira A. Flack in the Lake Geneva Auto Station. He is operating the business with Arthur G. Laurie, who bought an interest in the firm six months ago.

Frank and Wilber Winders, partners in the Winders Motor Sales Co., Columbus, O., have secured a 99-year lease of a site on the east side of Fourth street, that city, and will construct a three or four-story automobile sales room and service station.

Roy Davey who, at the request of the receiver, returned to his old post as general sales manager of the Bethlehem Motors Corporation, has announced his withdrawal from that organization. Announcement of Mr. Davey's future plans are withheld.

George Fritz, national field secretary of the Automotive Equipment association, has resigned to take effect Dec. 1, 1920. Mr. Fritz has acted in this capacity for four years and has been connected with the automobile industry for nearly 16 years. He has as yet announced no plans as to the future.



I. J. Cooper, President of Cooper Corporation, Cincinnati, O.



H. H. Brenner, General Manager of Cooper Corporation, Cincinnati, O.



J. W. Brumbaugh, Vice President of Cooper Corporation, Cincinnati, O.

## New Officials for Hare's Motors, Inc.

Harry M. Pyke, formerly sales manager of the Marmon-Long Island Co., Brooklyn, N. Y., has joined Hare's Motors, Inc., in the capacity of special representative. His field of operations will include New York state. Mr. Pyke has been connected with the automotive industry since 1907 and his experience has covered practically every phase of the business. He has been through the shops and has acted as purchasing agent. He has been a salesman and knows the advertising as well as selling end, though his principal experience has been as a sales executive. From 1907 to 1913 he was sales manager of the Carl H. Page Co., New York city, when it distributed Chalmers cars. In 1913 he was made manager of the Chalmers Motor Co. of New England, with headquarters in Boston. Later he served for three years as manager and sales manager of the Maxwell-Chalmers organization of Brooklyn. In 1919 he acted as special representative in the eastern district for Marmon, becoming sales manager for Long Island, which position he held until he joined Hare's motors.

B. C. Helm, formerly special representative of Hare's Motors, with headquarters in Philadelphia, has been appointed general sales manager of the company. He is recognized throughout the industry as a brilliant and capable sales executive and his experience covers a period of 13 years. Mr. Helm joined the Packard Motor Car Co. of New York in 1907 as a clerk in the accounting department. He was later made a salesman and had such success that he was made carriage sales manager for New York City. Later he was advanced to the position of general passenger transportation manager. Shortly after receiving this promotion he resigned to accept a commission as captain in the Motor Transport Corps, but resumed his place with the Packard New York Co. after the armistice. In the fall of 1919 the Packard Motor Car Co. appointed him eastern district manager, with headquarters at the factory in Detroit, which position he held until he joined the Hare's motor organization.

R. A. DeVlieg, formerly with Dodge Brothers, and a well-known figure in automotive circles, has been appointed chief engineer and factory manager of the Handley-Knight Co., and has assumed his new duties at the Handley-Knight Co., in Kalamazoo, Mich. This plant, which has just been completed, is regarded as one of the most modern in the country.

Paul Bennett, formerly wholesale district manager of the Cadillac Co., Detroit, Mich., has joined the sales force of the Gulf Oldsmobile Co., New Orleans, La.



### TESTS OF THE BRITISH RAPSON TIRE.

The following tests of the Rapson tire, manufactured by Rapson Automobile Patents, Ltd., London, England, recently conducted under competent supervision, are of interest in this country.

The first test consisted of the reading of the temperatures taken after one lap at an average rate of 58¼ miles an hour, a comparison being made of the Rapson and an American tire. The respective temperature readings were 101 degrees, Fahrenheit, for the Rapson, and 124 degrees for the American.

Second test—After five laps at an average of just over 50 miles an hour, the thermometers showed, after a lapse of one minute, that the Rapson tire was 20 degrees cooler than the American. The final reading, taken some minutes later, was 144 degrees for the Rapson and 146 for the American.

Third test—The American tire was exchanged for a British tire taken off a spare wheel, consequently stone cold. The Rapson was still hot from previous tests, registering 140 degrees at the beginning of the five laps at an average speed of 55 miles an hour, which made up this test. The result was 147 degrees for the Rapson and 157 for the British tire.

At the completion of the run back to town the tests read 85 degrees for the Rapson and 98 for the American.

### ADDITION TO AKRON RUBBER MOLD CO. WILL DOUBLE OUTPUT.

The accompanying illustration shows the addition to the plant of the Akron Rubber Mold & Machine Co., Akron, O., now in process of erection. Work is being hastened on this extension in order to provide needed additional production facility, the company being busy beyond its present capacity meeting the demands of the tire repair trade from export and domestic markets, as well as the requirements of tire factories for giant cord truck tire mold equipment. This addition, with new machinery, some of which has already been installed temporarily in the plant, will approximately double the present output of the company.

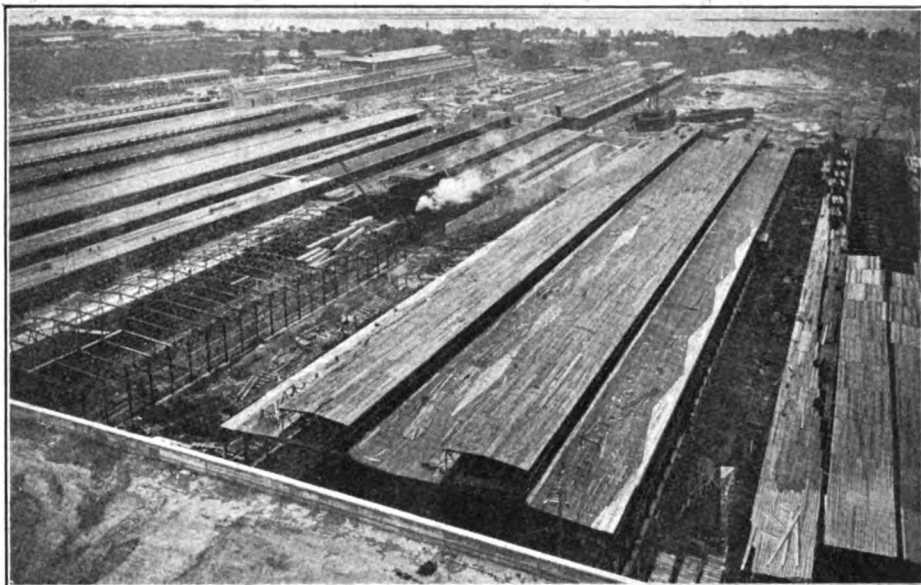


Addition to Plant of Akron Mold and Machine Co. in Process of Erection.

## Immense Plant of Dunlop Tire Co. To Be Run by Niagara Falls

The stupendous job being performed by the nation's greatest hydroelectric plant, at Niagara Falls, is given new emphasis every time another great industrial enterprise is harnessed to it. One

horsepower. In addition there are 15 motor generator sets with a total capacity of 1260 horsepower, and nine synchronous converters of a total capacity of 990 kilowatts. Most of these



General View of Factory Buildings Under Construction for Dunlop Tire & Rubber Corporation of America at Buffalo. Two Miles of Standard Track and Nine Miles of Narrow Gauge Railway Are in Use to Distribute Materials of All Kinds to Various Sections of the Site.

of the latest is the plant of the Dunlop Tire & Rubber Corporation of America, a \$15,000,000 factory located a mile north of Buffalo. The manufacture of tires requires a great deal of power in any case—and claim is made that this particular company will soon be one of the largest in the field, with a production capacity which will compare favorably with that of the other large manufacturers in the industry.

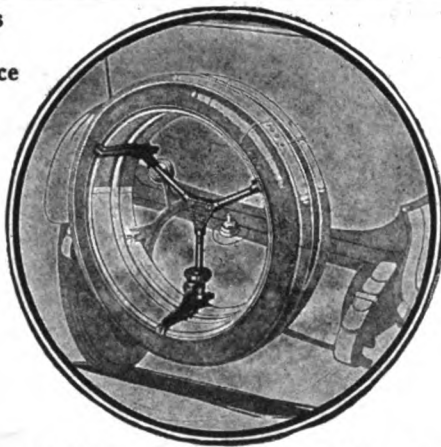
A part of the power will come from Niagara Falls direct, the balance being furnished by the steam plant of the Buffalo General Electric Co.

The factory units cover 35 acres of actual floor space. The initial installation at the Dunlop plant will require a total of 253 electric motors in all sizes, having an aggregate rating of 16,500

will be constant speed alternating current motors, among them being 12 500-horsepower synchronous motors driving lines of masticating and mixing mills and 18 250-horsepower synchronous motors driving warming mills. The variable speed motors are driven by direct current, which is supplied from synchronous converters located in the distributing stations, of which there are eight, in the factory. The largest of the direct current motors are of 100-horsepower and 60-horsepower, driving rubber strip and tread calendars respectively. The current comes to the plant at a tension of 12,000 volts and is received at a central sub-station of two stories, 85 by 110 feet in extent of ground plan, where it is reduced by the transformers to 2300 volts and then distributed through an underground cable system through seven sub-stations, each of which is 17 by 72 feet in extent and two stories high. Where alternating current is used, of course, there is merely a reduction of voltage through additional transformers, but in some of the sub-stations there will be converters to make the change to direct current.

Electric power is used to drive the air compressors furnishing the compressed air in the plant. Electric power is used in the operation of magneto clutches and brakes with which all the large lines of mills and rolls are equipped as a safety-first feature. Electricity further is responsible for the modern electric fire alarm system, telephone system and automatic call system by which superintendents and foremen can be located.

Reduces  
Your  
Insurance



### CARRIES TWO TIRES Makes Them Theftproof

The Twinlock is the *only* double tire carrier approved by the Underwriters Laboratories. It is the *only* tire carrier that secures a reduction in insurance, thus paying for itself. It carries one or two tires as desired and locks one or both against theft. We offer \$100 reward for the arrest and conviction of anyone stealing a tire from a Twinlock when it is locked. Can we say anything stronger?

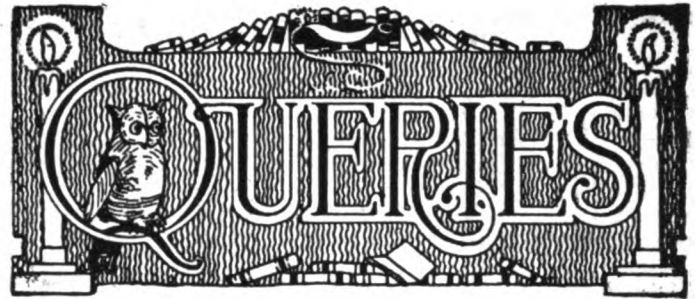
The Twinlock attaches to any car having a circular single carrier in a few moments, without the aid of tools or special attachments—without drilling or the need of a mechanic. Fits the rim snugly—cannot rattle. A handsome addition to the car. Rustproof, strong—does not injure tires. Guaranteed for ten years. The Twinlock has won instant success wherever introduced.

**The Twinlock Company**

1525 Cambridge St.



Philadelphia, Pa.



#### GASOLINE IN CRANKCASE.

(S. C. G., Warren, R. I.)

How does gasoline get into the crankcase of my Oakland car? I know it to be gasoline from the odor.

This occurs more frequently in cold weather because you have to run your car with the choke valve closed and, consequently, more gasoline is taken in than it is possible to consume with the amount of air that enters. Much of the excess gasoline runs down by the piston rings into the crankcase. More care in the adjustment and manipulation of the valve should lessen the trouble. Possibly the piston rings need to be refitted. On engines with badly fitting rings the gasoline will get by in large quantities.

#### WANTS TO ENTER RACING GAME.

(A. G. L., Blandon, Pa.)

I have a Ford car equipped with a 16-valve motor and would like to enter the racing game. Could you tell me how to go about it? What is the A. A. A. and what benefit is it to me?

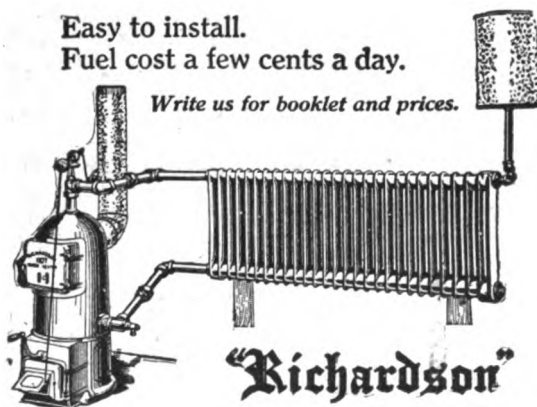
Also tell me how to go from one city to another with a racing car that has a side exhaust when the use of open cut-outs is forbidden?

The man who desires to become a racing driver must become known to those promoting contests. Probably the best course of training is service as a mechanic for a driver who is an attraction. This means hard work and plenty of it during training and racing periods. A man who owns a small car may become known through participating in local competitions and then increasing his activities, while the demand for his services will depend largely upon his success. A reputation as a racing driver may be made in one contest, but a man must have the necessary qualifications, the skill and resourcefulness to make a race, no matter what the conditions. The best opportunity would be with the crew of a well known driver, and this would probably be far more remunerative than endeavor to do occasional racing with a small car.

The American Automobile association's objects are: To unite in one body all automobile clubs and individual motorists of the country; to secure reasonable and just legislation and to aid in proper enforcement of automobile laws and ordinances; to obtain local, state and Federal aid in the construction and maintenance of good roads; to encourage road travel and transportation and to secure, prepare and disseminate information relative thereto; to support sportsmanlike contests and other movements which will advance motoring interests. The A. A. A. controls racing in that all competitions of consequence must be sanctioned by it to insure recognition of records; that records are chiefly of value to racing drivers because these establish the commercial value of their services; that competition in unsanctioned races might be followed by suspension that would prohibit participation in sanctioned races for a specific period; that all race promoters recognize this jurisdiction and observe the conditions; that this authority undoubtedly insures to the public and to racing drivers fair contests under uniform regulation. Membership and registration by the racing board qualifies a driver for engagement, but his value as an attraction depends entirely upon his skill. All well known drivers are registered by and race under the rules of the A. A. A.

## Heat Your Garage The Richardson Way

Easy to install.  
Fuel cost a few cents a day.



**"Richardson"**

**Automatic Garage Heater**

Now is the right and economical  
time to equip your garage

**RICHARDSON & BOYNTON CO.**  
98 Federal St., Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Racing cars are frequently fitted with exhaust pipes and mufflers that can be quickly installed or removed for use where ordinances or laws prohibit open exhaust. Such cars are not commonly driven where there is much traffic and when taken from one city to another they are generally shipped by railroad if there is time, or, if the distances are not great, they may be towed. Without knowledge of all regulations of towns and cities through which such a car might be driven on the road good judgment demands that an exhaust and muffler be temporarily fitted, which will insure against infraction of regulation.

#### WEAR ON ENGINE CYLINDERS.

(F. J. M., Buffalo, N. Y.)

Why does an engine cylinder wear more on the front than the sides?

There may be instances where an engine cylinder has worn as indicated by the query, but these are very few as compared with the number worn by the thrust of the piston in them. The piston wristpins and the crankpins of the crankshaft are parallel and with practically all engines the movement of the crankshaft is clockwise, so that the piston is forced against the left wall of the cylinder while descending on the explosion stroke and against the right wall while ascending on the compression stroke. The piston is smaller diameter than the cylinder, being largest at the bottom and smallest at the top, but instead of taper the "lands" or sections above and between and below the rings increase in diameter from top to the bottom. This is to insure clearance when the piston has expanded from heat. The rings are fitted in grooves or channels in the walls of the piston and as these expand from tension against the walls of the cylinder the grooves are not solidly filled. For this reason the piston may be slightly rocked in the cylinder. As the wristpin is above the center of the piston, under pressure uniformly exerted against the piston head the rings contacting against the cylinder walls, there is no wedging action, but piston is for a part of the stroke forced against what has been termed the sides when descending after the explosion and while ascending when compressing the fuel. There is, of course, no pressure during the exhaust or suction strokes that would cause cylinder wear. After the engine has been driven for a considerable period the crankpin and the wristpin bearings, or the piston bushings if the wristpin oscillates, become worn and the crankshaft may wear its bearings. The rings may be worn and movement of the piston against the walls become more pronounced. In some instances the "slap" of the piston against the walls may be heard. The "throw" of the piston by movement of the crankshaft is against the sides of the cylinder and if lubrication is not complete the wear may be sufficient so that when tested with a multiplying gauge or a micrometer the bore will be larger when measured at right angle to the crankshaft and wristpin than when measured parallel with them. The side pressure of the piston in the cylinder will vary with the angularity of the connecting rod and the length of the piston. If there be end play of the connecting rod on the crankpin or wristpin the engine can be safely driven, but if there is side play there is danger of excessive wear of the cylinder. When cylinders are fitted with pistons the sides of the pistons must be precisely right angle to the crankpins. If not, there will be cramping of the pistons under pressure that will cause excessive wear on the cylinders. The correct relation of the pistons with reference to the cylinder walls is obtained by squares that are seated on the crankcase and the connecting rods and pistons are assembled and have precisely the same positions they would have in the cylinders.

When cylinders are worn and are not perfect cylinders the obvious restoration is reboring and fitting either oversize pistons, or, if lapped instead of bored, oversize rings may be sufficient. The original clearance of a piston in a well built engine is at least 1/1000 inch for each inch of cylinder diameter, and this for the bottom land. The upper "lands" will be each 1/1000 inch smaller and the total clearance in the upper or top "land" will be at least 7/1000 and possibly as much as 10/1000. These figures are exceeded in some engines,



At over 70 miles an hour "Miss America," Zenith-equipped, wins the Gold Cup and shatters all records of from 5 to 30 miles.

Whenever dependable carburetion is essential Zenith supremacy has been proven, on the water, on the land and in the air.

**Zenith Carburetor Co.**  
New York DETROIT Chicago

**ZENITH**  
CARBURETORS



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# COES *The Standard WRENCH*



**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.

## GREB RIM TOOL



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

**DO THE SENSIBLE THING.**

Provide yourself with the best rim tool on the market and save time, trouble and rims.

### GREB RIM TOOL

You can quickly expand or contract any make of cross-split demountable rim—the Greb is universal and takes them all, especially the Kelsey.

**TEN DAYS' TRIAL.** If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

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**THE BARRETT COMPANY**

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St. Louis Cleveland Cincinnati  
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especially those used for racing, in which the top clearance may be as high as 15/1000 and the lower from 6/1000 to 10/1000. The excessive clearance is intended to insure against "seizing" from large expansion when driven long distances at maximum speed.

In normal wear there should be very little change in the diameter of the cylinder paralleling wristpin and crankpin.

### CONNECTING MAGNETO WITH DRY CELLS.

(H. M. W., Chickasaw, Pa.)

1—With a Dixie magneto in a four cylinder engine that could only be started by spinning; after exciting the primary winding of the magneto with three dry cells the engine can be started with one turn of the crank. Can I excite the primary winding of this magneto and with a double-throw switch, cut the cells out of the circuit after starting and close the primary winding circuit so the magneto will supply the current as without the excitation? Is such a proposition practical, or will the outside current demagnetize the magnets of the magneto?

2—Can I excite the primary winding of a Bosch magneto with three dry cells and start the engine when the permanent magnets are so weak that sufficient current to start the engine cannot be developed by hand cranking? Can this be done with any high-tension magneto which has weak magnets?

3—Why are the revolving wings of a Dixie magneto separated by a bronze center piece?

4—Can a magnet be insulated? If so, what with?

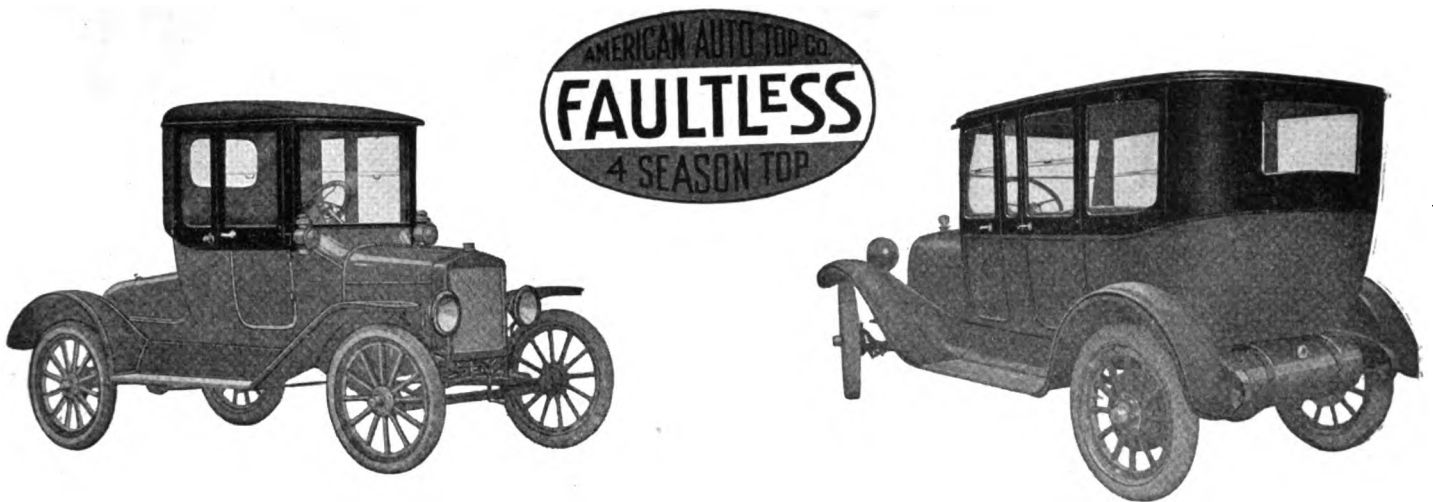
By connecting the three dry cells in series to the primary wiring of the magneto, which is designed to transform the current it generates through primary and secondary windings, the battery current is transformed in the same ratio that the magneto current is transformed. This means that you have high voltage developed and available the instant the circuit is closed. Dixie magnetos are a high-tension type and should have sufficient capacity to fire an engine at very slow turning. You have used the magneto windings to obtain current transformation that would normally be obtained. by a battery of dry cells, a transformer coil and a switch, installed so that after starting on the current from the dry cells the switch could be turned and the magneto current utilized. The magnets of the magneto are steel, which will retain magnetism for a long period of time, but which are susceptible to demagnetization by passing a battery or other outside current through them. While the result cannot be determined without test, the magnets are very probably demagnetized. In such event, while the magneto will transform and distribute the battery current, there is little probability that it will generate sufficient current to fire the engine satisfactorily. The use of a dry cell battery and a switch such as you describe would repeatedly demagnetize the magnets. The magnets were no doubt weak from continuous use or from some abnormal influence when you found the engine started only with spinning. The only practical restoration is remagnetizing, which can be done by the manufacturer or by those who have the necessary equipment. The magnets are ordinarily magnetized by passing a current of electricity through them several times for brief periods.

The Dixie magneto is what is known as the inductor type, and the rotor has two wings carried by the magneto drive shaft that revolves between the poles of the magnets, one adjacent to the north pole and the other to the south pole. They are in effect the rotating poles of the magnet. Because each rotor always revolves close to its own pole of the magnets they always maintain the same magnetic polarity, one always being positive while the other is always negative. As the rotor wings must be separate and distinct they are separated by the bronze centerpiece, which is a conductor of electricity, but will not retain magnetism. As the rotor revolves it causes the magnetic lines of force to be so distorted that the magnetism flows back and forth through the field structure and the core of the windings, first in one direction and then in the other, according to the position of the rotor and its relation to the poles of the field structure.

Electric conductors can be insulated; nothing will control magnetism in the sense of limiting its activity.

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This top was named "Faultless" because it was made that way.

It was built to please people who have said they "wouldn't have" a demountable top.

It was built to look smarter than anything of its kind. Of course it cannot be the cheapest.

The trifle more cost has added a lot more value—and makes it easier to sell.

Get our circulars. They tell you exactly **IN WHAT RESPECT** it is better.

**WHERE, HOW, WHY, IT IS SUPERIOR.**

Order a demonstrator top at once. It will sell many for you this year, and they'll make friends and boosters.

If you are the kind of man who is thinking of the future—getting customers to plug for you, mail the coupon.

## PRICES REDUCED TO PRE-WAR QUALITY FULLY MAINTAINED— IS MAKING BIG SALES

The owner who is too conservative to buy a new closed car just now is the man who grabs at the Faultless body for the car he is now driving.

For **THIS KIND** of a business, conditions are **JUST RIGHT**.

Put a demonstrator Faultless Top on a Ford or Dodge right away. Before the selling season is any further advanced get this Faultless salesman on the job. Make some money now.

This is by far the best Ford or Dodge top you have ever seen. It outlasts the car that carries it. Owners trade in their old cars but keep the top to put on the new car. It stands up and makes friends when it is two, three and four years old—just like it did the first year.

Get the full details and sales plans and make some real money.

Mail the coupon. Size up this live proposition.

**THE AMERICAN AUTO TOP CO.**  
K Street, Delphi, Ind.

**TEAR OFF AND MAIL THIS**

**American Auto Top Co., Delphi, Ind.**

Gentlemen: Please send full particulars of your Faultless Top and sales plans for your kind of business.

Firm Name.....

Address .....

Kind of Business.....

AGJD

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*Make sure this name plate is on every replacement spring you buy.*



**When Springs Break,**  
put on **VULCAN**  
The Replacement Spring

*This VULCAN display rack captures attention. We send it free with your first order.*



Your knowledge and experience with VULCAN Quality, VULCAN Service, and VULCAN Fit render it easy for you to recommend VULCAN replacement springs to your customers.

The margin of profit that you realize on VULCAN springs is sufficient to warrant your carrying a full assorted stock, covering almost all needs in your community.

Your jobber probably handles VULCAN springs and will make you an attractive proposition. If he cannot supply you, write us—today.

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Branches:

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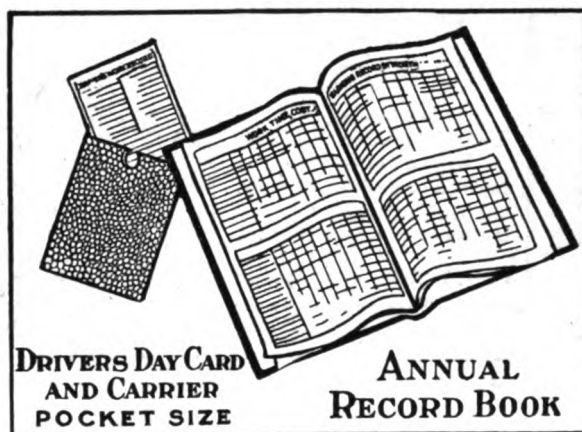
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**Know what it costs to Run your Truck**  
**Learn what your Truck Earns**  
**Know your Truck Profit and Loss**

## UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

**Price \$10 — Delivered**

Address Record Department

**MOTOR TRUCK**

**Pawtucket, Rhode Island.**

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## HOTEL EMPIRE

Broadway at 63rd Street  
NEW YORK CITY  
"The Hotel of Easy Access"

**Room, use of bath \$1.50**

Parlor, bedroom  
and bath, **\$3.00**

Add to the above rates, 50c. for each  
additional person.

All Subway,  
Elevated, Surface and Bus Lines  
lead right to the door.

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OUR RESTAURANT  
is noted for its excellent food and  
moderate prices

P. V. LAND - Manager

Centrally  
Located  
Near all the Famous  
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## BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

**AUTO-LITE LIGHTING AND  
STARTING SYSTEMS.**  
Complete Stock of  
**GENUINE PARTS.**  
All Work and Parts Guaranteed.

## William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.



## American Adjusting Association

424 OLD SOUTH BUILDING,  
BOSTON 9, MASS.

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**SOFT, CLEAN, WHITE COTTON WASTE.**  
Assorted wiping rags—New, clean sanitary. Sample on request.  
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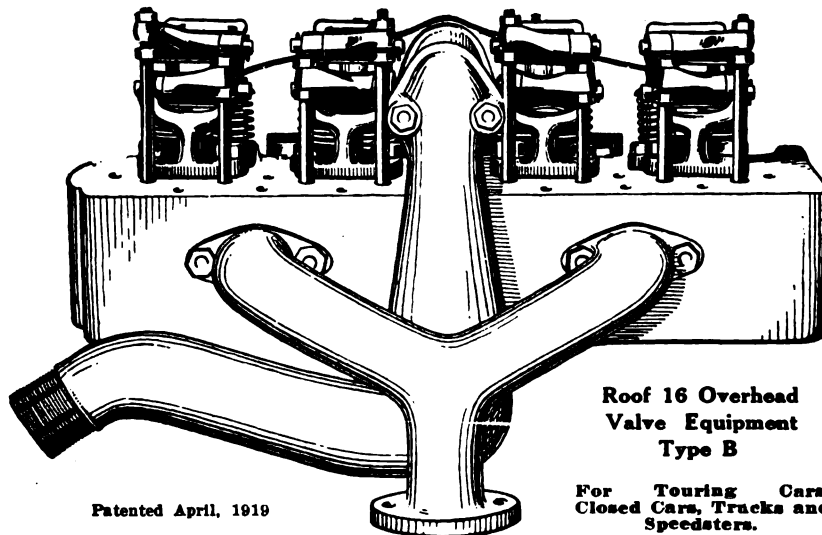
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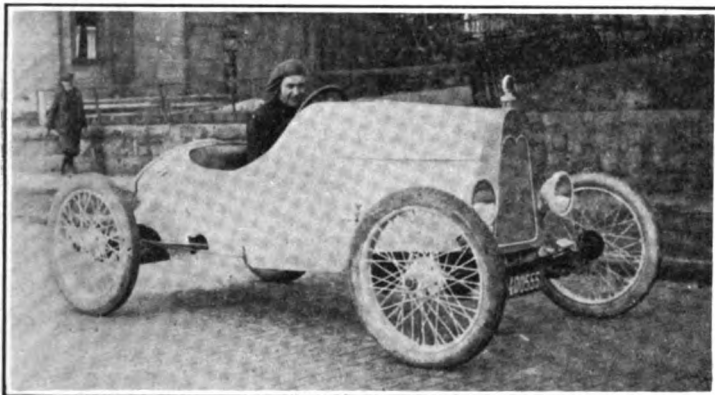


## The Most Remarkable Power Device, Even in This Inventive Age

Hill climbing for touring cars—pulling power through sand and mud—doubles the hauling capacity of converted Ford truck-speed for mile and half-mile tracks to rival the fastest cars built. Ford racing cars with our Cylinder Head Equipment and special racing parts have attained speeds from 80 to 100 miles per hour. Hill climbing and pulling power for touring cars, closed cars and trucks. Cylinder head equipment all ready for installation. It takes the place of the regular Ford Cylinder Head. Any mechanic can easily and quickly install it.

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Milner Motor Car Co.....Monroe, La.  
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Sixteen Valve Cylinder Heads for Dodge Motor after January 1, 1921.

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**AUTOMOBILE  
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In the dead of winter you can greatly increase your profits and strengthen the good-will of your customers by selling "PEERLESS PRODUCTS FOR FORD CARS."

The demand for PEERLESS HONEYCOMB RADIATORS is not seasonal. When other lines of your business become dull and inactive, you can rely on the PEERLESS for strong, steady sales.

Winter or summer, the reliable Peerless Radiator for Ford cars offers unsurpassed sales opportunities. The ever-increasing replacement of radiators makes ours an unusually good proposition for DEALERS.

**Retail Price \$25.00**

Ask your jobber or write direct.

**The CORCORAN Mfg. Co.**

Dept. 5.

Cincinnati

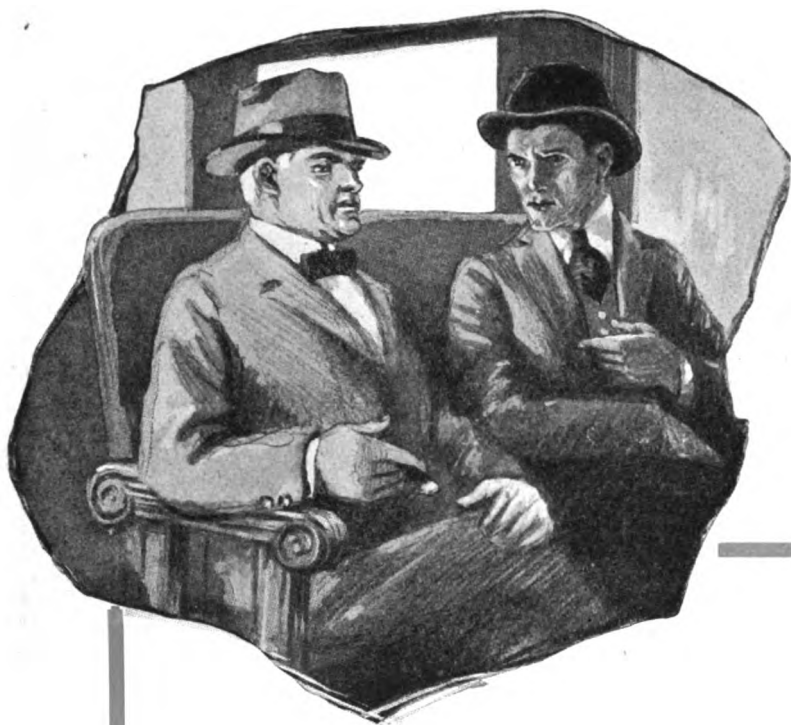
Norwood



The Peerless Guaranteed Honeycomb Radiator is designed to meet all requirements for Ford cars. Its unique core construction, which gives it so much cooling surface, also permits of a flexibility that will withstand freezing.

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"Tom," said Holman, "I'd like to travel the Norwesco line. Think they'd take me on?"

"Why, maybe—but what's

wrong with the line you've got?"

"Well, it's this way—if I'm going to sell a radiator repairer, I want one that the dealers are glad to stock. I've found all my customers like SE-MENT-OL. It's put up in a standard, one size-can—there's no need to load up the shelves with several different size cans. The dealer sees where he makes more money on a smaller stock when he handles SE-MENT-OL. I'd rather sell Norwesco than buck it."

## SE-MENT-OL ( LIQUID AND POWDER )



One can of SE-MENT-OL is enough for the largest cooling system. *Guaranteed* to repair cooling system leaks *permanently*.

SE-MENT-OL Liquid, kept in the radiator, will keep the cooling system leak-proof for the life of the car. It is the *original* self acting radiator repairer.

Get rid of the slow selling brands that come in several sizes. Push SE-MENT-OL, in the popular one-size can.

**Retail Price, Liquid or Powder, 75 cents**

*Write today for dealer's proposition and discounts.*

**The Northwestern Chemical Company**

731 State Street,

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# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., DECEMBER, 1920.

NO. 5.

## Cold Weather Devices Which Add to Motorist's Comfort

### *Accessories That Make for Economy and Add to the Pleasure of Winter Touring*

**E**ACH year, as cold weather approaches, the motorist is given a wide choice of accessories that may be added to the car and are designed to make driving more economical and pleasureable during this season.

Devices of many descriptions are on the market that may be attached in a few minutes time that will start the engine more quickly, cause it to run better on the road and will prevent the cooling system from freezing while the car is standing still. These components are of various forms and, according to their type, may be attached to various parts of the engine or car.

Certain of them make use of electricity from the storage battery or the garage lighting system for their operation, while still others take advantage of the exhaust gas from the engine by passing it through a special flexible tubing which fits around the intake manifold, between the carburetor and the engine.

To enable the car to be readily started, where the garage is not heated, and at the same time to obviate the wasting of

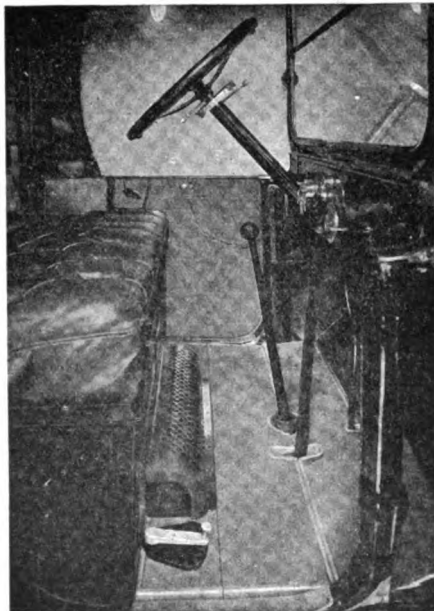
the energy from the storage battery by the use of the starter before the engine becomes warmed up, many devices are now on the market which may be attached to either the carburetor or manifold.

Electricity plays an important part in their operation and is drawn usually from the storage battery, a wire being led from the battery to a suitably located switch and continued on to the heating device. A coil of wire forms the heating unit, which may be placed either in the carburetor bowl, on top of the carburetor, or on the under side. Closing the circuit heats the gasoline sufficiently to enable the engine to be started readily. When placed on the intake manifold it may be operated by electricity or by heat from the exhaust pipe, according to

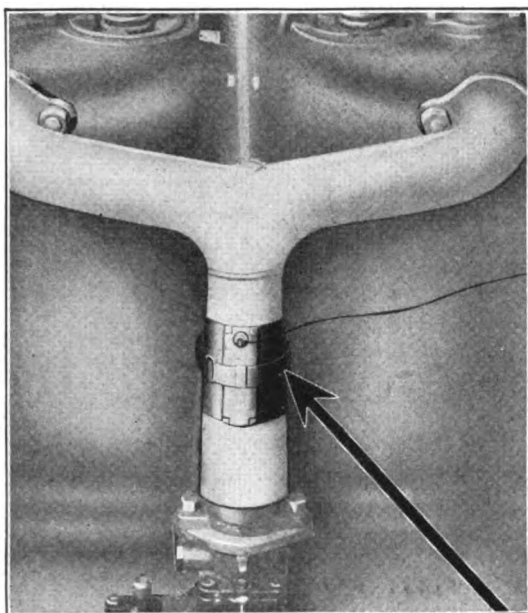
the idea incorporated in the heater by the manufacturer.

#### Primers.

Many primers are also made which facilitate the starting of the engine. Various principles are employed on these, some consisting of simple priming cups located either on the engine intake manifold piping or, as in many cars, in the valve plugs directly over the valves. It is necessary in this type of priming device to squirt gasoline or a mixture of gasoline and ether directly into the engine combustion chamber through the priming cup. This method is not so quick and often times the process has to be repeated several times before the engine will start. A much simpler method has lately been devised which is being fitted to passenger cars, especially of the enclosed type. This primer consists of a pump cylinder and plunger which is attached to the dash of the car, has a knurled button on the end which the operator can grasp when operating, and is supplied on the outer end with two openings, each having a ball check valve and suitable fittings to connect copper



Right—Gas Heater Located in Floor of Car, Heat Control Under Cowl of Dash. Center—Heater Adapted for Use in Sedan, Coupe, Limousine and Also in Enclosed Cabs of Trucks. Left—Gas Heater in Center of Sedan Floor Controlled by Small Handle.



**Electric Manifold Heater Connected Through Switch with Storage Battery of Car.**

tubing to the main fuel line and to the connection provided on the intake manifold. To operate, the pump plunger is given a quarter turn to unlock it from the bracket and is pulled back towards the operator. Gasoline is drawn from the main fuel pipe through the connecting tubing to the cylinder of the pump on the dash. The operator next forces the pump piston into the cylinder and, as he does so, the gasoline held in the pump cylinder by the check valve is forced out of the cylinder through the connecting tubing to the fitting on the intake manifold and enters in the form of a mist, the combustion chamber over the valves. This method supplies the gas in such a form that it is immediately fired when the engine is turned over by the starter with the ignition on. The starting of the engine is a very simple matter with this primer even when the engine is cold after standing for several hours. The cost of this primer is usually not over \$5, or about \$8 attached. Any garage or service station man can easily install this primer and once in place it is ornamental as well as useful.

Any method of starting the engine quickly without drawing heavily on the

storage battery is worth while, for it is a well known fact that the storage battery is at its lowest efficiency during the cold season. The act of operating the engine with the starter draws a very heavy current from the battery at the beginning, the amount of current used tapering down to a smaller amperage as the starting motor gets up to speed. Continuous cranking on a cold morning will do more to exhaust the battery than will many hundred starts of short duration under ordinary conditions.

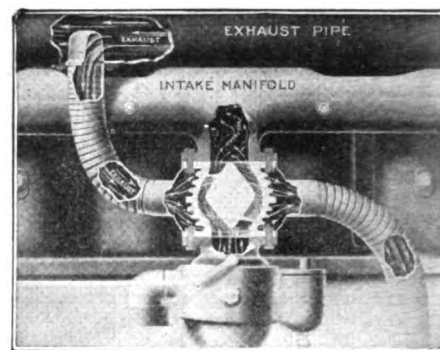
Nearly all passenger cars and trucks are now fitted by the manufacturer with some form of choking device which enables the operator to run the engine partially choked till the engine becomes warm enough to vaporize the gas in the regular manner. The choker is attached to the carburetor in such a way that the engine draws in a rich mixture of gasoline as long as the choker is held in a partially closed position. The rod which operates the choker extends to the dash on cars equipped with electric starters, and to the front of radiator on cars and trucks not so equipped. Pulling the rod forward closes the choker, while releasing it opens it. The choker is simply a shutter which closes the air intake tube of the carburetor, shutting off the in-rushing air while the engine is being turned and allowing the engine to suck in raw gasoline. Opening this valve gradually allows the engine to run smoothly till it becomes warm.

#### The Hot Spot.

A number of makes of engines have been equipped with a hot spot arrangement, this device being particularly effective when working with low-grade gasoline. It consists of a special exhaust manifold which is fitted with one or more projections over which the exhaust gases pass as they leave the combustion chamber of the engine. As the intake manifold is directly in the rear of these points, it receives a certain amount of heat direct from them and the in-rushing fresh gas is heated to a point at which it vaporizes readily. Many claims are made by the manufacturers for this device, all of which, it is reported, are not fully substantiated in actual use. Probably better results are obtained by a method used on other cars, consisting of a flexible tube connecting the air intake of the carburetor with a stove fastened to the exhaust manifold. Through this tube warm air is drawn to the carburetor, heating it and the gasoline at the same time. Provision is made for lessening the amount of heat in summer and increasing it in winter so that the engine may operate under as near ideal conditions as possible the year round.

#### Heaters for the Enclosed Car.

Heaters for the enclosed car have been brought to a high state of perfection in the last two or three years as, with their more general use has come a demand for

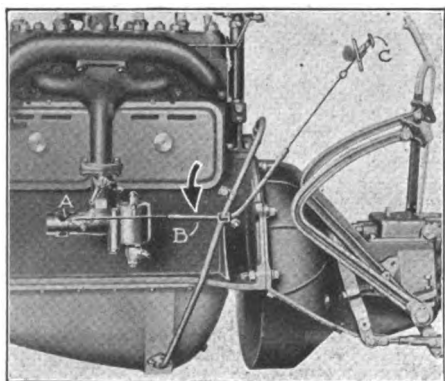


**Manifold Heated by Exhaust Gas Passing Through Flexible Metal Tubing.**

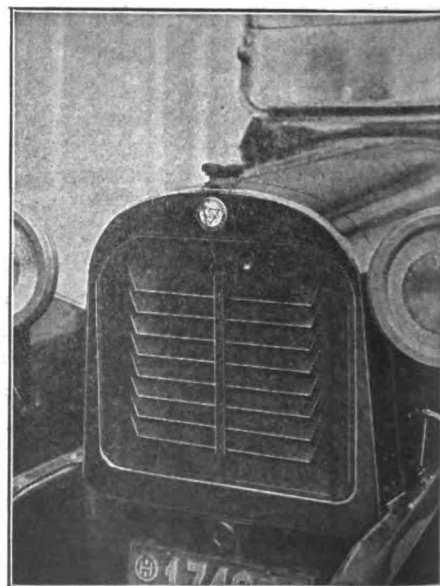
some method of heating them in cold weather that would be both practical and low in cost. Some two or possibly three years ago the first heaters were introduced. The public grasped the idea quickly and today nearly all manufacturers of cars selling for above \$2000 supply them with heaters of one design or another. Electricity from the storage battery proved too costly for this purpose. While the control was ideal, the battery was soon exhausted, requiring filling frequently from outside source.

The exhaust heater has proved by far the most practical method of warming the enclosed car, advantage being taken of the exhaust gases as they pass through the muffler. A special valve is fitted to the exhaust pipe which leads the burned gas into and through the coils of the heater and back into the exhaust pipe to the muffler. The coils are located either under a grating square in shape in the floor, or through the foot rest, or a heater may be placed behind the occupants' feet. A grating covers the heater coil at a distance sufficient to obviate all danger of burning, while the exhaust gases do not enter the interior of the car, being confined in the heater coil.

Regulation of the heat may be through an extended rod to the dash, a foot pedal



**Method of Attaching Choker Rod to Dash and Choker on Carburetor.**



**Radiator Shutter, Controlled by Driver from Seat.**

or a small lever on the side of the heater, provision being made to close off the heater when its use is not desired.

#### Enclosed Cabs for Trucks.

For the truck driver who has considerable long distance driving to do, the manufacturers who make a specialty of commercial cabs and bodies have developed the enclosed cab, with tight-fitting glass windows that may be opened or closed and side doors which open outward. Such cabs are made for year round service and at slight cost can be equipped with exhaust heaters of the heel board type, which can be opened or closed at the will of the driver. For long distance service these cabs are very desirable as truck driving is a cold job at best and takes the driver out in all kinds of weather.

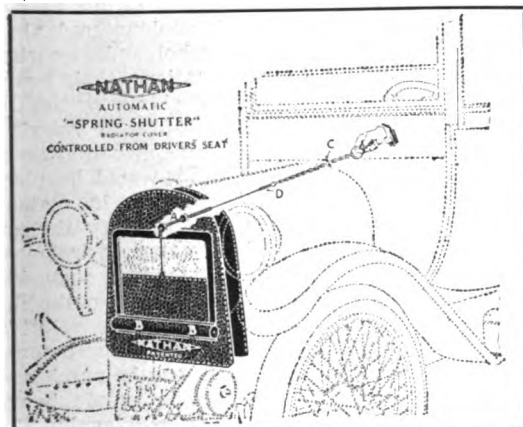
Protection and comfort for the driver are necessary and as the cost of fitting such a cab to a chassis is slight when building a new truck, as compared to the older style of open cab with side curtains, it is well worth the purchaser's consideration when purchasing a new truck, or when replacing a cab with a new one on a used truck.

Such cabs are built by several standard manufacturers and are made especially strong to withstand strains and stresses when passing over uneven road surfaces.

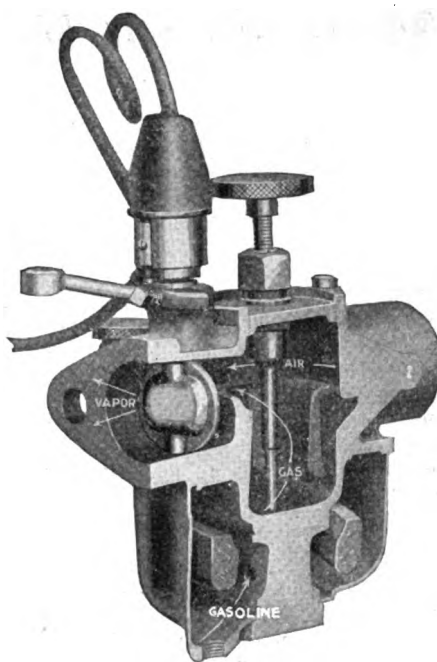
Cabs of this type are especially well made, are reinforced throughout with iron and are usually fitted with metal dash, bolted rigid to the truck frame. Plenty of light is provided the driver through glass set in the sides of the cab, in the top of doors and in the rear, giving the driver an unobstructed view when driving ahead or when backing the truck.

The addition of an exhaust heater to cabs on trucks making long trips adds considerably to the personal comfort of the driver.

The heater may be located at the rear of the driver's feet at the bottom of the seat box. It is connected by piping to the main exhaust pipe through suitable fittings and is provided with a shut-off valve which controls the flow of heat to the heater. In this manner any degree of heat can be obtained in the cab, while during summer weather the heater may be shut off entirely. No extra expense



Radiator Cover Fitted with Roll Flap Controlled by Cord from Driver's Seat.



Novel Method of Heating Carburetor and Gas Vapor: Connected Through Switch to Storage Battery of Car.

is incurred, as the heat is supplied while the engine is operating and is wasted if not used. When the engine is stopped the flow of heat of course also discontinues, but some heat is retained in the heater for some time.

#### Garage Heating Units.

In this connection it may be pertinent to call attention to various garage heating units, consisting of a heater and the necessary radiators and connecting pipes or, in the simpler forms, may be found a heater composed of a sheet iron tank having a spout or box open at one end which is pointed into the radiator of the car after it has been driven into the garage, heat being supplied by an oil stove, and delivered through the spout into the radiator and, in this manner, keeping the cooling medium of the car warm. Such heaters are used successfully in small one-car garages, while the larger coal-burning types are used in garages built to hold two or more cars. The cost of operation is small with either type, while the care necessary to keep them running is said to be only a few minutes each day.

Still another form of heater which is very popular is the electrically heated device, which consists of two coils of wire supported by a wooden handle and connected to the garage lighting system by means of a switch and cord.

The heater is hung on the supporting rod between the

dash and radiator, in close proximity to the radiator, the electricity turned on, and the coil keeping the water in the radiator warm enough to start the car easily.

Some garage owners simplify this method by making use of a large 40-watt lamp protected by a cage instead of the heater, claiming that the lamp works as satisfactorily as the heater. Any method that will keep the water warm will assist greatly in starting the car during the night or in the morning. For a car left standing in the open, heaters of a six-volt type may be purchased that may be attached to the storage battery, obtaining electricity in this manner that will keep the coils of the heater hot.

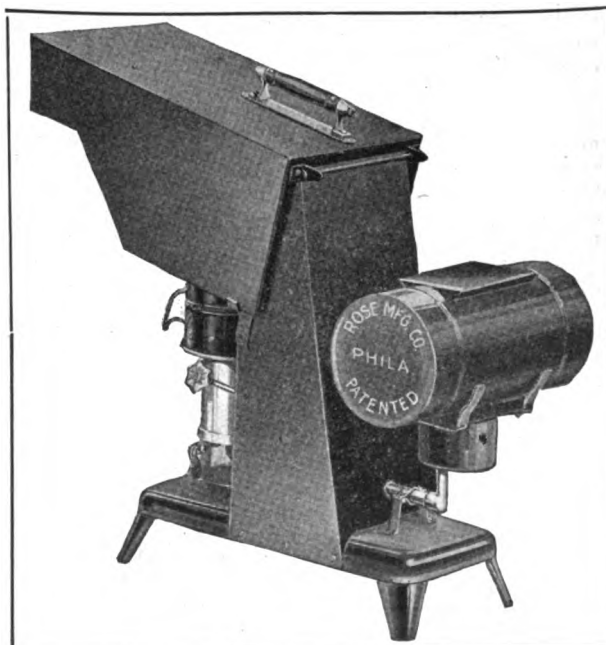
In some instances, where the garage is located near the owner's house, it may be advisable to connect the garage to the house heating system and thus the car and garage may be kept warm at small cost even on the coldest days.

#### Radiator Shutters.

Cars equipped with radiator shutters are becoming very popular with motorists, as they offer a year round means of preventing the cooling medium from cooling off too rapidly.

The shutter consists of a special shell, which is fitted to the radiator, and is provided with a series of parallel flat strips of metal about three-quarters of an inch wide, held at the sides of the shell by small bearings which allow the strips to turn freely. One end extends beyond the bearing and is connected to a vertical rod by a short arm. Suitable fixtures connect with the vertical rod to a rod which passes over the engine to the dash, where the shutters may be controlled at the will of the driver.

The shutters may be set at any angle from full closed to wide open, giving the driver an opportunity to meet varying conditions of temperature, which is a decided advantage when operating the car the year round.



Type of Kerosene Heater That Is Proving Very Popular in Isolated Garages Where Only One Car Is Stored.

## Anti-Freezing Mixtures and How to Use Them

**V**ARIOUS compounds are recommended each year at the beginning of cold weather for use in the cooling system of the passenger car or truck to prevent the contents of cooling system freezing and causing damage to the radiator, pump and jackets of the engine. The proper time to guard against this damage is at the very first cold snap, and the motorist should see to it that an anti-freeze mixture is added to the water in the cooling system and he will then have nothing to fear from the cold days which follow.

The ideal requirements of a non-freezing compound are as follows:

It should have no harmful effect on any part of the cooling system with which it comes in contact. It should be easily dissolved in or combined with water. It should be reasonably cheap in price. The substance should not readily waste away by evaporation, that is, its boiling point should be as high as the water, otherwise overheating will result. Foreign matter should not be deposited in the engine jackets, inside of radiator or pipes as, for instance from chloride, alcohol or a mixture of alcohol and glycerine or kerosene.

able to the occupants of the car. On warm days in winter there is a tendency for the engine to overheat on account of the difference in coefficient of heat of kerosene and water or alcohol. Kerosene also rots the connecting rubber tubing.

Alcohol, either denatured or wood, is the fluid which is most used for this purpose and has been found to come the nearest to securing the desired result of any of the compounds or substances on the market. The chief disadvantage in its use is that it evaporates quickly on warm days and fresh alcohol has to be added at intervals to keep the mixture at the correct freezing point.

### Denatured Alcohol.

Probably the most common and convenient substance for preventing a cooling system from freezing is denatured alcohol. It has no destructive action whatever on either metal or rubber, makes no deposits in the jacket of the engine or the connecting pipes, and never causes electrolytic action. A solution composed of 50 per cent. water and 50 per cent. alcohol will stand about 32 degrees below zero. The only disadvan-

combined with it. Calcium chloride is derived from hydrochloric acid and is liable to contain free acids, which will attack metal very readily. Calcium chloride has the same appearance as chloride of lime, but has a somewhat different chemical composition; for this reason only pure calcium chloride should ever be used. The commercial chloride of lime is apt to set up electrolytic action. The solution may be tested for acidity by dipping a piece of blue litmus paper in the solution. If acidity is present the litmus paper will turn red. As the water is evaporated in the radiator there will be a crust formed on the inside of the jacket, and also in the connecting pipes. This crust has a tendency to clog the system and prevent free circulation of the cooling solution. The rate at which these deposits are made depends on the strength of the solution.

Calcium chloride is readily dissolved in water, does not evaporate to any extent and also withstands low temperatures without freezing. The general practise is to use five pounds of the salt to one gallon of water. This solution, it is stated, will stand a temperature of

## Composition and Freezing Points of Various Solutions

### Denatured Alcohol and Water.

Per Cent. by Volume of Alcohol	Specific Gravity of Solution	Freezing Point
10	0.988	24° Fahrenheit
20	0.975	14° Fahrenheit
30	0.964	— 1° Fahrenheit
40	0.954	—20° Fahrenheit
50	0.933	—32° Fahrenheit
60	0.913	—45° Fahrenheit
70	0.897	—57° Fahrenheit

### Alcohol, Glycerine and Water.

Alcohol and Glycerine, Per Cent.	Water, Per Cent.	Freezing Point
15	85	20° Fahrenheit
25	75	8° Fahrenheit
30	70	— 5° Fahrenheit
35	65	—18° Fahrenheit
40	60	—24° Fahrenheit
45	55	—30° Fahrenheit
50	50	—33° Fahrenheit

### Calcium Chloride.

Per Cent. by Volume of Calcium Chloride	Specific Gravity of Solution	Freezing Point
10	1.085	22° Fahrenheit
15	1.131	13° Fahrenheit
20	1.119	0° Fahrenheit
22	1.200	— 9° Fahrenheit
24	1.219	—18° Fahrenheit
26	1.242	—28° Fahrenheit
28	1.268	—42° Fahrenheit

Oil has the advantage of having a very high boiling point so it does not waste away, but it has the disadvantage that it does not make a good mixture with water. It will not absorb heat so readily as water and also has a lower heat coefficient; that is, it takes less heat to raise the temperature of a certain amount of oil one degree, than it does the same amount of water. Oil cannot be used where there is any rubber in the circulating system, as it causes the rubber to deteriorate rapidly.

The disadvantages of using glycerine are similar to those of oil, but the most important is the sure destruction to the rubber connections. Glycerine is also liable to contain free acids, and besides is quite expensive.

Many owners labor under the impression that kerosene makes a good non-freezing solution when used either with water or alone. Kerosene cannot be recommended for this purpose, as it is of an oily nature and readily separates from water when cool; besides its boiling point is low, causing the kerosene to evaporate quickly. The vapor rising from the evaporating kerosene is liable to ignite if brought near an open flame. The odor given off is also very disagree-

able is that it evaporates more readily than the water so that when adding new solution, it should be remembered to add more alcohol than water in order to keep the solution of the proper strength.

The combination of alcohol, glycerine and water seems to give very good results. In this combination equal parts of alcohol and glycerine are used. The alcohol has a tendency to overcome the destructive action of the glycerine on the rubber connections, and the glycerine keeps the alcohol from evaporating too rapidly. The freezing point depends on the strength of the solution. A solution of 60 per cent. water and 20 per cent. each of alcohol and glycerine, freezes at 24 degrees below zero. The proportions must be governed by the locality in which they are used.

The specific gravity is given to be used as a check on the proportions.

If wood alcohol is used instead of denatured alcohol, slightly lower temperatures can be withstood with the same proportions of alcohol and water.

### Calcium Chloride.

Many of the prepared compounds found on the market consist of a calcium chloride base with other substances

39 degrees below zero Fahrenheit freezing. By referring to the table showing the percentages of calcium chloride that may be used, one can gauge the amount to withstand whatever temperature it is expected to encounter from 22 degrees above zero to 42 degrees below.

The addition of a small amount of glycerine to an alcohol and water solution reduces liability of evaporation, and when used in such quantities it has no injurious effect to speak of on rubber hose connections. The denatured alcohol table and the alcohol and glycerine table show the combinations, their freezing points and the specific gravities of the solutions as fitted for the varying temperatures found in each locality. Such a mixture may easily be tested by placing a portion of the solution in a glass receptacle deep enough to allow the entrance of a special testing hydrometer which will show at a glance the specific gravity of the solution and also the degrees, Fahrenheit, at which the solution will congeal or freeze. Such instruments are on the market and may be purchased from most any accessory supply house for a nominal sum and will enable the motorist or truck owner to test his radiator solution at will.



# Los Angeles Speedway Races Marred by Three Fatalities

**T**HE closing big racing event of the season in the automobile field on the new board speedway at Beverly Hills, Los Angeles, Cal., Thanksgiving day, was marred by a collision between two of the contestants, which caused the death of both principals and the mechanic of one car. The dead are Gaston Chevrolet and Eddie O'Donnell and Lyall Johls, O'Donnell's mechanic. John Bresnahan, mechanic for Chevrolet, escaped with slight injuries. The accident occurred when Chevrolet was in the 146th lap and O'Donnell in the 138th.

The race was for a distance of 250 miles and the prize money of \$15,000 was won by Roscoe Sarles, who drove without a stop the entire distance. He led in every lap and at no time lost his position for a second. The race was limited to cars of 183 cubic inches piston displacement and was almost an exclusive Duesenberg contest. Milton, Sarles, O'Donnell, Miller, Thiele and Murphy drove cars of this make and Hearne's car had a similar power plant. The other starters were Thomas and Chevrolet in Frontenacs, Crosby in a Patterson Special and Melcher in a Melcher Special.

Sarles jumped from winning laurels on the county fair tracks of Indiana to a big track star almost in a single season. He won no less than three of the major events of the 1918-19 winter season on Pacific Coast tracks.

## Time Summary.

The time summary was as follows:  
Distance Covered, 250 Miles.

Driver	Time	Av. M.P.H.
Sarles .....	2.25.20	103.2
Miller .....	2.27.14	102.3
Hearne .....	2.27.27	101.8
Murphy .....	2.31.41	98.9

## Chevrolet Was Season's Champion.

The death of Chevrolet in this, the last championship event of the year, is all the more to be regretted from the fact that he needed only to take fifth place in this race to become the racing king of the season. He entered with a standing of 2030 points and Milton or Murphy had to win first place to beat him. Milton was eliminated early and Murphy was far behind. Ralph De Palma, who might have given him a struggle, had not entered because his car had not arrived in time.

Gaston Chevrolet came into prominence this year when he won the Indianapolis 500 mile race. He was the junior member of the Chevrolet family and has teamed with his brother Louis and Arthur at the wheel of a Frontenac. Ralph Mulford and Joe Boyer, Jr., have teamed with Gaston at various times also. Chevrolet won third place in the 1917 Memorial Day race at Cincinnati and in 1918 went outlaw along with Barney Oldfield, Earl Cooper and Louis Dis-

brow, campaigning the western dirt tracks.

He was reinstated in the A. A. A. in 1919 and since then has figured prominently in nearly all of the major racing events of the country. He drove a Monroe Special at Indianapolis this year, where his earnings for the day amounted to \$36,000.

## O'Donnell's Record.

Eddie O'Donnell, one time a farm hand hailing from Wisconsin, for years has been associated with the Duesenberg race cars. He was with Fred Duesenberg when the latter first brought out his race creation under the name of Mason Specials. It was in 1916 when O'Donnell put up his stellar performance in racing circles when he was awarded the road race championship. His knowledge of the internal combustion engine and the ability to interpret race track performance made him a valuable asset to the Duesenberg team. He was teamed at various times with such drivers as Milton, Murphy, Rickenbacher and Henderson and always could be counted upon to hold up his end.

## Accident Will Not Halt Future Events.

Officials of the Los Angeles Speedway association, commenting on the serious accident of the recent meeting, while expressing regret, said that the incident would not halt future racing events.



Roscoe Sarles, Winner of 250-Mile Race at Los Angeles.



Gaston Chevrolet, Season's Racing Champion, Who Was Killed During the 250-Mile Race on Los Angeles Speedway.



Eddie O'Donnell, Well-Known Racing Driver, Killed in Collision During 250-Mile Race on Los Angeles Speedway.

## Radium—A New Element in the Safety Movement

(By ARTHUR ROEDER, Radium Information Service, New York City.)

**R**ADIUM, the most mysterious and most powerful element known to science, which has the greatest power of all discovered sources of energy, has now been linked with the safety movement and will lend its power to the prevention of avoidable accidents. So great is its power that one gram is sufficient to raise a ton of water from the freezing to the boiling point. If one ton of it were harnessed to a ship equipped with 1500 horsepower engines the ship would be propelled at the rate of 15 knots an hour for 30 years.

Radium is best known to the world through its curative properties in the treatment of cancer and through its commercial value in making radium luminous material. The power of radium was made known only a few years ago through the efforts of a Polish woman scientist, and a French and an American professor. Radium now treats thousands of cases of cancer annually, preventing death and eliminating a great deal of suffering.

Radium's role in industry as a life saver is less spectacular, but perhaps even more important than it is as a therapeutic agent. The great mass of accidents in factories, in mines and in other industrial institutions where darkness is a creator of danger, are being eliminated through the newest invention of science—radium luminous material. Radium illuminated watches are familiar articles. The same material that illuminates these is now being employed in great factories on all power line switches where fumbling might mean electrocution to the operator.

**Gauges, Electric Switches, Etc., Illuminated.**

High pressure gauges, which are installed as an insurance against dangers are deprived of a great deal of their safety value through inconstant lighting. Their dependability as indicators is increased tremendously through making them safe 24 hours a day by the application of radium luminous material, which is invariably luminous in the dark. Steam gauges and water gauges of all sorts are making use of radium to increase safety.

Electric switches are often set in places which are unlighted. This includes electric lighting equipment, which is usually visible only after the light it controls has been turned on. A spot of radium luminous material on the bottom of switch makes them easily located in the dark, so that in emergency they may quickly be made use of.

Likewise, a fire alarm or a fire extinguisher is deprived of a good deal of its efficiency through being invisible in the dark. Radium luminous material acts as a quick locator for them. Telephones which are often necessarily found quickly in the dark in emergencies, various emergency call bells and revolvers are

made more useful through the application of "Undark." Gun sights, illuminated, insure accuracy of aim in the dark. The need of luminating poison bottles, so that they may stand out warningly in the dark has been demonstrated too often to need further dwelling on. An interesting safety device is the safe combination whose dial is radium luminated, so that no artificial light need be used for it.

The industrial uses of radium luminous material are many. Bolts that are necessarily attached to the dark under portions of machines and equipment are being touched with dabs of this luminous material with a consequent great saving of bloodshed. In mines where the carrying of oil lamps or the placing of electric lighting equipment is not feasible, radium has been found to be a boon to humanity. There are dark corners in the dark underground channels which miners must traverse, corners where danger lurks—these are made safe through the unvarying luminosity of radium.

The value of radium to mariners is commencing to be recognized. Not only the compass dials, but the steering wheels, the gauges, and other instruments which should be instantly and uninterruptedly visible have been touched with radium. Motorists, motorcyclists and the operators of any machinery which has indicating dials, or gauges which tell of the speed of the motor or the quantity and mixture of fuels and oils, are finding the solution of their difficulties in radium luminous material. The hazard of uncertainty has been reduced.

While radium is the most valuable element in the world—a gram of radium, which is about a thimbleful, costs \$120,000, as opposed to \$150 for an ounce of platinum—so powerful is it when mixed with other materials that even the minutest particle is effective in making material self-luminous for years. It is this quality which makes radium luminous commercially possible.

The great value of radium is due to its scarcity, and to the great difficulty in isolating it after it has been found. Much of the radium of the world is now found in America, in carnotite fields. A great portion of this comes from the Undark Radium mines in the Paradox valley of Colorado.

The ore is found in narrow seams in the ground. It is sorted and packed in 100-pound sacks and transported 60 miles to the nearest railroad station on the backs of burros and mules. Thence it is shipped in carload lots 2900 miles across the continent to an extraction plant in Orange, N. J. Two hundred fifty tons of ore treated with an equal amount of chemicals and water yields one gram, which is about the size of a pin head.

The power of radium lies in the pene-

trating character of its rays, which disintegrate and travel at the rate of 3000 miles a quarter of a second.

In addition to the use of radium luminous material on machinery in industrial plants, it is used extensively for the marking of any corner or spot which should be visible in the dark. Angles of tables and chairs, corners in rooms, numbers to indicate cubby holes or doorways on which there is no other illumination are touched with a spot of "Undark." Even the valuable electric torch increases its efficiency when it has a touch of radium on it so that it can be reached instantly in an emergency in the dark.

When other lights fail, when fuses blow out, wires break down—radium will glow dependably without danger of explosion or of burning.

The employment of radium to help solve our medical and industrial problems of life safety is as yet in the first stages of its development. What the future will bring, no one knows.

### IMPORTANCE OF CRANKCASE LUBRICATION.

A recent test showed that to prevent excessive engine wearing the oil in the crankcase should be changed at least every 1500 miles, preferably every 1000 miles.

A new engine that was run 6000 miles with the oil changed at proper intervals, upon being disassembled, showed no signs of wear. The same engine, reassembled and run 6000 miles with the old oil plus new oil as needed, upon inspection, showed a wear of .015 inches.

Truck and passenger car manufacturers recommend that for better performance and longer life, crankcases be drained every 1000 miles, the engine flushed with kerosene and new oil added.

### TAR REMOVER FOR TAKING PAINT OFF GLASS.

The tar removers which are designed to clean up machines after being run over newly tarred roads are also excellent for removing ordinary house paint from window glass.

If accessory dealers will advertise their line of tar removers as suitable for this purpose they will soon find themselves serving customers who do not own automobiles.

### CLEANING MATERIALS.

Washing soda, kerosene and plain soap and water should be the cleaning agents used by car owners for cleaning parts, tools, etc., about the garage. Gasoline is not as good as these others and the cost is considerably greater. For taking grease spots out of clothing some of the inflammable fluids now on the market are better than the present grades of gasoline.

# HUMOROUS SIDE OF MOTORING

## NO WAY TO TALK ABOUT A PERFECT LADY.

The two dear girls on our right were talking animatedly:

"She's good looking, but I don't think she's all she ought to be."

"Neither do I. Look at the way she did down in front of Muehlebach that night!"

"That's what I say. But she does show speed."

"Speed, O, boy. And roughness—you can always depend on her for that."

"Her lines aren't bad."

"I guess that's what took dad's eye. You know dad."

"Do I? But, privately, I think she's making him sorry."

"That's the best think she does—all paint and form, and nothin' much under the hood."

"I think dad's going to get rid of her before long. She's burning up his dough too fast."

"Who is the unspeakable person?" we inquired. "I'd like to meet her."

"Person? Djegit that, Mayme? Why, listen, son, we were talkin' about dad's new car."—Kansas City Star.

## SENTENCED CAR—SPEEDER GOES FREE.

A California judge recently established a unique legal precedent and at the same time doubtless the offender was effectively punished. An automobile driver was brought up for exceeding the speed limit and after hearing the case the court gave the car an indeterminate sentence in jail, and told the owner he would have a chance to think it over while going about on foot for a few days. It is said that after the speeder got his car back it was noted that he kept his eye on the speedometer when driving in the territory under the jurisdiction of this particular judge.

## BEATS THE PARCEL POST.

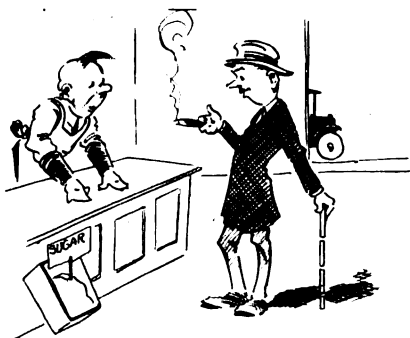
The police of Mercer, Pa., are making arrests by mail. They watch for speeders, take their numbers and file actions in justice courts against the owners discovered through the state motor directory. The accused persons are then notified by letter that cases are pending against them and that if they see fit to send by mail the amount of the fine and costs, usually \$14.50, that it will not be necessary for them to appear in court.

## HOW TIMES HAVE CHANGED.

The old-time girl that once said, "You'll have to ask father," now chirps up and says, "Step on the gas, Bill, dad's gaining ground on us."

## GAS GAVE OUT.

A little girl on being asked how she was so successful at catching a chicken, replied: "Oh, I just runned him till his gas gave out an' then I picked him up."



## POSITIVE PROOF OF ABILITY.

Merchant (interviewing applicant for position of salesman)—So you really feel you could sell goods?

Applicant—Sure. Anything from a Rolls-Royce to a pea-shooter. For instance, that car of yours outside.

Merchant—Yes, sir?

Applicant—Well, I sold that to a guy who was passing.

## NAME OF TOWN, PLEASE.

A Rockland man in an auto trip over the Mohawk trail found a town where milk sells for seven cents a quart and rump steak for 30 cents a pound.—Boston Globe.

## THE REASON WHY HE DON'T.

Most motorists are blooming fools. They trifle with the traffic rules.

I don't.

No man should try to get the drop On any seasoned traffic cop, Nor fail to heed his sign to stop.

I don't.

A man should never drive too fast, Or brag about the cars he's passed;

I don't.

For Safety First should be his creed. There really isn't any need To drive a car at reckless speed.

I don't.

A man should never lose his bean When piloting a gas machine.

I don't.

On city street or open road, A man should never break the code, Nor fellow farers incommode.

I don't.

He should not scare equestrians, Nor chase the poor pedestrians.

I don't.

In fact, I have no car to run. I'm shy the coin to purchase one. You'd think I wouldn't have much fun!

I don't.

—C. Wiles Hallock, Florida Motorist.

## "SAFETY FIRST" WAS HER MOTTO.

In a village down South there was a physician noted for his reckless driving. One day when he answered the telephone a woman's voice asked him if he were going out automobiling that afternoon.

"No; I hardly think I have time this afternoon," replied the doctor. "But why do you ask?"

"Well," replied the anonymous questioner, "I want to send my little daughter down town for some thread, if you are not."

## IDEA WAS WORTH THE MONEY.

Jakie—I bet you \$5 I can tell what you are thinking about?

Able—You're on, what was it.

Jakie—You was thinking of buying a second-hand car for about \$200, insuring it for \$500 and letting it get on fire. Do I win the bet?

Able—Well you don't exactly win, but here's the money, the idea is worth it.

## AN INVIGORATING TONIC.

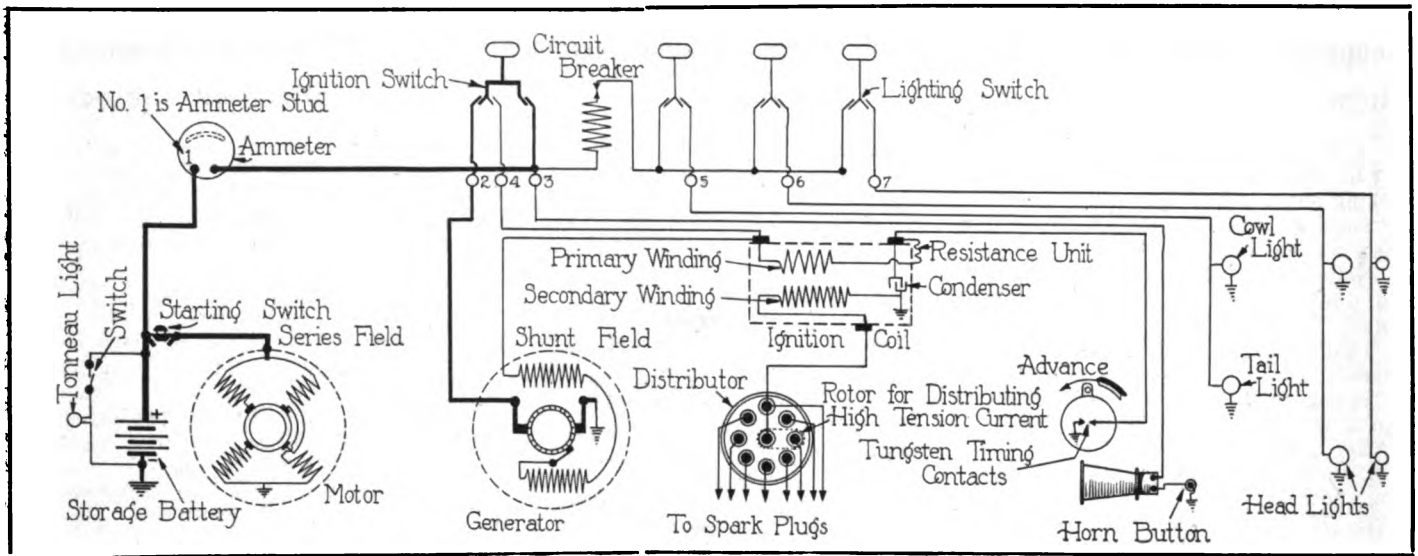
"Is this tonic intoxicating?"

"A customer drank a bottle yesterday," replied the truthful druggist—"only one bottle, mind you—then jumped into his flivver, drove madly to the top of Red Mountain and shouted 'Glory hallalulah!' so loudly he could be heard the length and breadth of Jones Valley. 'I'll take two bottles.'"—Boston Globe.

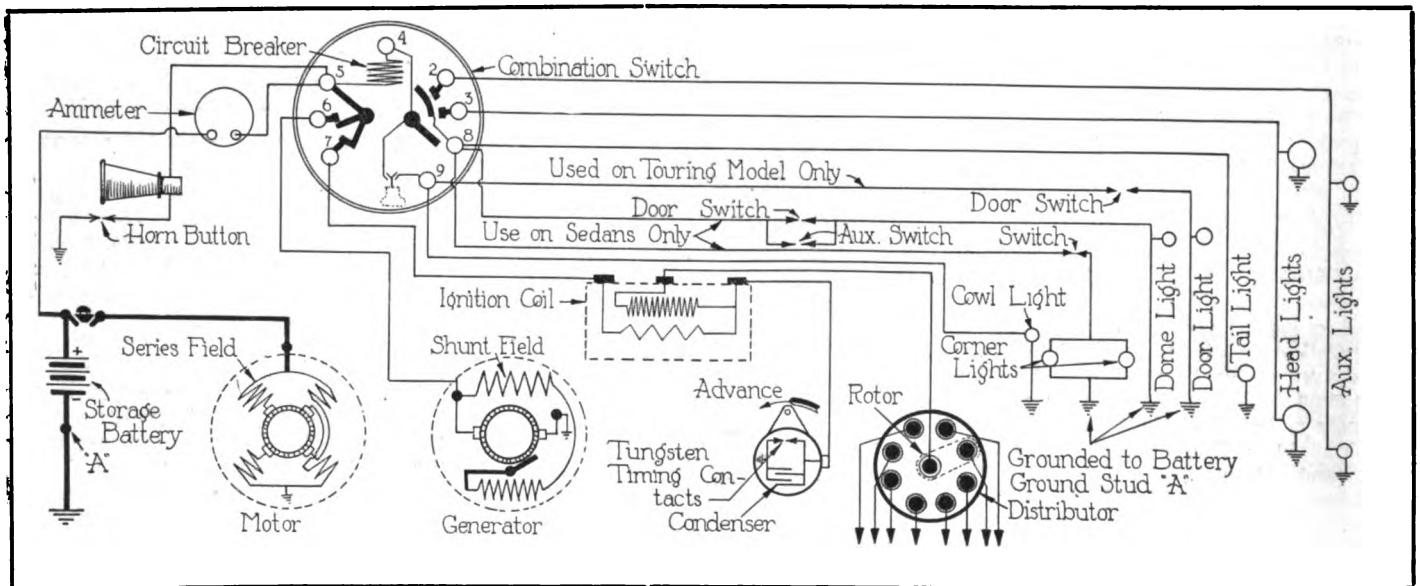
Cop (angrily, to fair motorist): The next time ye don't stop at me signal, I'll pinch ye!

Fair Motorist (coloring): How dare you!

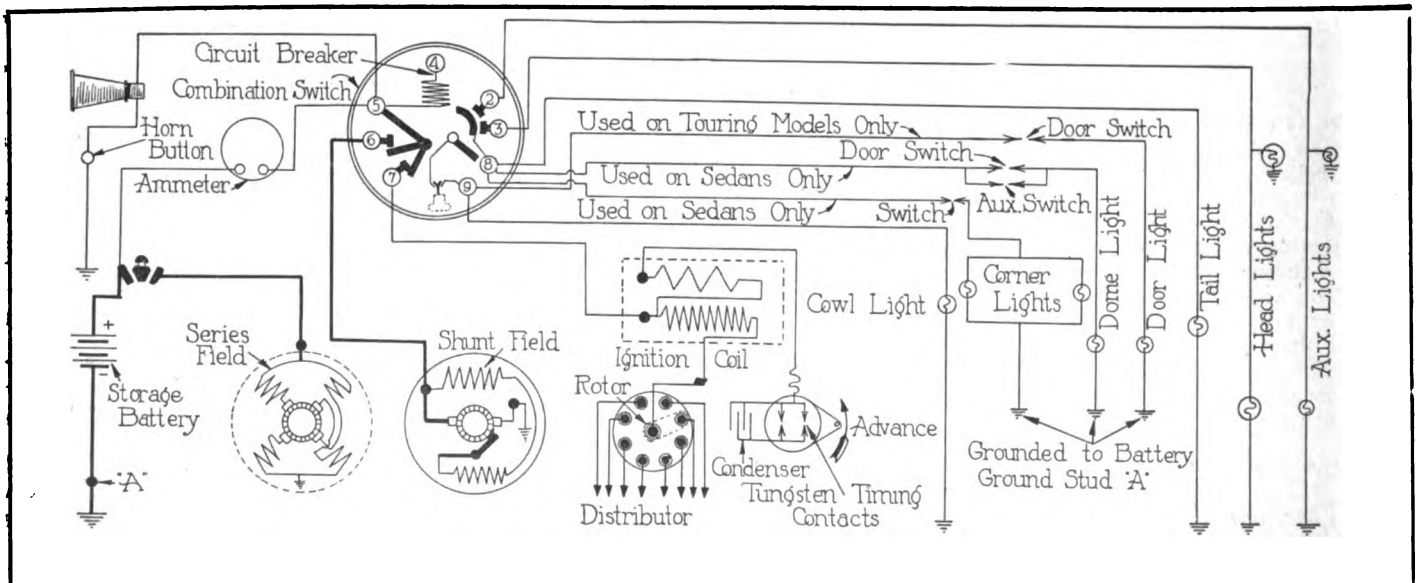
# Monthly Wiring Diagram No. 10



Cole 8-66 and 8-70, 1916 and 1918 Eight-Cylinder Cars, Delco System.



Cole 8-70, 1919 Eight-Cylinder Cars, Delco System, Showing Lighting Circuits of Closed Models.



Cole 8-70, 1920 Eight-Cylinder Cars, Delco System, Showing Lighting Circuits of Closed Models.



# NOTES OF INDUSTRY AND TRADE

## Additions to Dort Motor Car Factory

During 1920 additions to the Dort Motor Car Co. at Flint, Mich., and the Gray-Dort Motor Co. at Chatham will amount to more than 500,000 square feet. The first unit of the new Dort plant at Flint is practically completed. This is on the 70-acre tract in the new industrial center. One mile of industrial track penetrates the property, which also is served by the Grand Trunk railway and soon will have the Pere Marquette as well. This first unit is reinforced concrete, three stories high, and consists of two wings, each 96 feet wide by 312 feet long, the ultimate length to be 516 feet. The two wings are connected by a glass covered court 60 feet wide, giving a first floor space at present of 252 by 312 feet.

The structure is strictly modern, steel sash, sprinkler system, the latest type of lighting, heating and ventilating, and

plant in that city, absorbing a vehicle company and erecting a number of units which make this one of the principal plants in Canada.

### LARGE EXPORT ORDER FOR ELGIN SIXES.

Charles S. Rieman, president and general manager of the Elgin Motor Car Corporation, announces the receipt of an order for approximately \$1,500,000 worth of Elgin Sixes from Gaston, Williams & Wigmore of New York for shipment to the various countries of Europe.

### PROMINENT DEALERS DISTRIBUTE LIBERTY CARS.

L. D. Allen, one of the foremost distributors in California, has just been appointed Northern California representative for the Liberty Motor Car Co., De-

## Will Make New Vanderbilt Car

The Union Steel Manufacturing Co., maker of Union reamers, tools and automotive parts, has purchased a factory in Brazil, Ind., and will move its entire equipment from Chicago in a few days. The company is said to have orders for custom built cars totalling \$500,000, and a fast growing business in other lines has made it necessary to get larger floor space. The new building has 60,000 square feet of floor space, and three acres of ground. The new car will be known as the Vanderbilt and will have a power plant consisting of eight cylinders in a row. It is to be designed along the lines of the Rolls-Royce, and the chassis is to sell for \$4000, with body styles ranging in price from \$2500 to \$7500. A. J. L. Dueth, general manager for the company, has been identified with the American automobile indus-



First Unit of New Dort Motor Car Plant at Flint, Mich.

has four high-speed elevators. The latest type of machinery and equipment is being installed.

Also at Flint are the new service building, for the parts and service departments, four stories high, 40,000 square feet; a steel structure for final inspection, 7000 square feet; another steel structure for heat treating and riveting, 5000 square feet, and an additional warehouse, 30,000 square feet.

Many improvements have been made to the Lull Carriage Co.'s plant at Kalamazoo, Mich., taken over for the building of Dort bodies. A new power house, six dry kilns and a storehouse for dry lumber bring the working floor space up to 150,000 square feet.

Of importance to the trade is the announcement that William A. Henderson is manager of the body factory. Mr. Henderson is recognized as a leading body designer, was with Holbrook & Co. of New York and has designed bodies for the royalty of Europe and notable citizens of this country.

The Gray-Dort Motor Co. of Chatham, has added 275,000 square feet to the

troit, Mich. Mr. Allen conducts one of the largest retail organizations for the sale of automobiles in the United States, having branches in Oakland, Sacramento, Stockton and Fresno, with a \$500,000 headquarters in San Francisco.

Another well known distributor, who has taken on the Liberty line is the A. G. Kaufman Motor Car Corporation of New York city, which has been appointed to handle the car in the metropolitan territory. The new distributor has already placed several very good orders.

### NEARLY 1,000,000 FORDS SOLD IN FISCAL YEAR.

Authentic information sets the number of finished Fords placed on the market in the company's fiscal year at 970,000, and the company is understood to have orders on hand for 185,000 more cars. The schedule for the current year calls for the manufacture of 1,250,000 automobiles and 250,000 tractors, and the factories at the present time are turning out 4000 vehicles daily.

try for 14 years, and has spent five years abroad making a thorough study of high-grade cars in some of the best factories in France and England.

### ENLARGED QUARTERS FOR UNITED MOTORS SERVICE.

The United Motors Service, Inc., which gives official factory service on Delco, Klaxon and Remy, Harrison radiators and Jaxon rims, has recently moved into new quarters in the Durant building, Grand boulevard and Cass street, Chicago. When the company was formed, four years ago, it occupied 600 square feet on the 23rd floor of the Dime Bank building. The entire personnel consisted of three persons. The company now employs 175 and the new offices have an area of 18,000 square feet. In addition to handling the lines mentioned the company has recently added Jorgensen primers, Foremost tires and Cardinal brake lining for the convenience of its patrons. This firm has branches in 20 large cities and more than 200 authorized distributors.

# Personal News of Industry and Trade

## Death of Head of Dodge Brothers Co.

Horace E. Dodge, who has been the head of the Dodge Brothers automobile interests since the sudden death early in the year of his elder brother, John Dodge, died on Dec. 10 at his winter home, Palm Beach, Fla. Although his health was impaired by a severe attack of influenza, his serious illness had not been reported. The Dodge brothers founded the automobile business that bore their name at Detroit, Mich., eight years ago, after manufacturing automobile parts since the early days of the industry, when they were associated with Henry Ford.

Charles Evans, Jr., more popularly known as "Chick," in winning the United States National Amateur Golf championship, as well as the Western Amateur Gold championship, conferred such prestige on the Edgewater Golf club of Chicago, of which he is a member, that the members showed their appreciation in a substantial manner by presenting him with a Mercer runabout, made by that division of Hare's Motors, Inc.

Lieut.-Col. Theodore Roosevelt, Jr., recently made a rather remarkable run from Los Angeles to Santa Barbara, Cal., in a Cole Aero-Eight, made by the Cole Motor Co., Indianapolis, Ind. He left Los Angeles three-quarters of an hour after the "Lark," the fast railroad special had departed, and made the 96-mile run in two hours and 22 minutes, reaching Santa Barbara ahead of the "Lark."

Roger P. Fisher, Daniel B. Jack and Thomas Lavier are the executives of the Ray Battery Co., formerly of Detroit, which has moved its plant to Ypsilanti, Mich. This company specializes on the manufacture of batteries which contain, in a highly perfected form, the Lavier formula plates.

Ernest P. Lash has joined the Philadelphia Locomobile branch of Hare's Motors as sales and service representative, with headquarters at Reading, Pa.



R. E. Chamberlain, New General Assistant Sales Manager of Packard Co.

E. J. Krause, Jr., has been made manager of the service station equipment division of the Fairbanks Co., Broome and Lafayette streets, New York city. He is well known in automotive circles in the Middle West, having been eight years in St. Louis, and recently general sales manager of the Service Station Equipment Co., for which the Fairbanks company is now exclusive sales agent. Mr. Krause's headquarters will be at the Service Station Co.'s factory in Chicago, known as the service station equipment division of the Fairbanks company.

H. W. Avery, Jr., has been made director of Marmon sales by the W. D. Block Motor Co., distributor in Detroit. He was, for 10 years, with the Packard Motor Car organization as sales manager at Cincinnati, O., and Buffalo, N. Y., and as special representative for the Packard-Detroit branch.

Leigh Smith, who has been in charge of the service department of the Fisher Body Co., has been made service manager of the Fleetham-Buick Co., Wyandotte, Mich.

## Packard Car Co. Promotes Chamberlain

R. E. Chamberlain has been promoted by the Packard Motor Car Co., Detroit, Mich., to the position of general assistant sales manager. His experience with the Packard organization dates back to 1916 when he assumed the duties of truck sales manager of the New York Packard Co., and he later became truck sales manager of the Detroit factory. Prior to joining the Packard organization Mr. Chamberlain was identified with the Garford Motor Truck Co. as manager of the Philadelphia branch and before this with the Wilcox Truck Co. of Minneapolis, Minn.

W. O. Browne has been appointed general sales manager of the Southern Motor Manufacturing Association, Ltd., Houston, Tex. He comes to Southern Motors with an excellent record in the sales end of the automotive industry, having been connected with several of the leading automobile concerns of the country as factory representative and branch manager. Just previous to joining Southern Motors he was district manager and special representative of the Bethlehem Motors Corporations, Allentown, Pa., associating himself with that concern upon leaving the United States air service, in which he served as an enlisted man and later as an officer in the United States and France, from April 22, 1917, to March 31, 1919.

H. G. Spangler has been appointed manager of the Boston station of the National Chain Motor Service Corporation, and Charles Colstat has been promoted to the office of chief engineer, with headquarters at the main office, 811 Boylston street. Mr. Spangler has been in business for himself in Boston for 20 years and is recognized in the trade as an authority on automotive repair service.

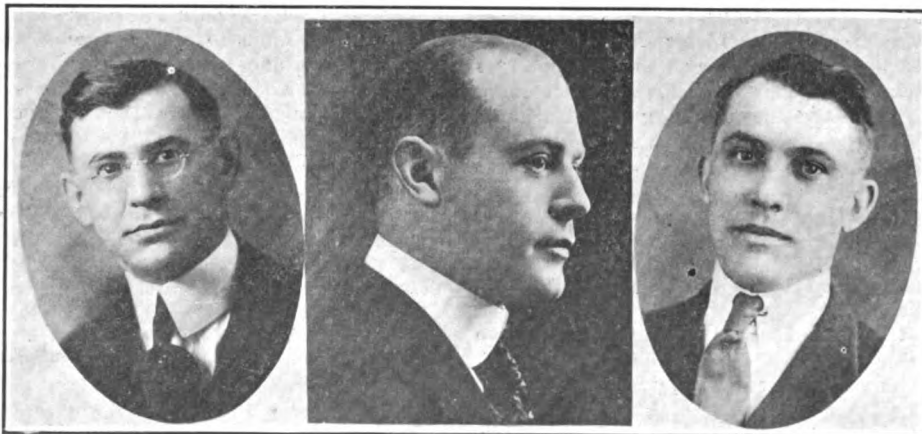
Thomas F. Moore has become executive secretary of the Automobile Dealers' association of New York, vice Harry Gardner, who has become sales manager of the passenger car division of the Packard Motor Car Co. at Detroit, Mich.

C. L. Dunning, who has been assistant superintendent at the White company's Long Island plant, has been transferred to the Chicago branch of the same company.

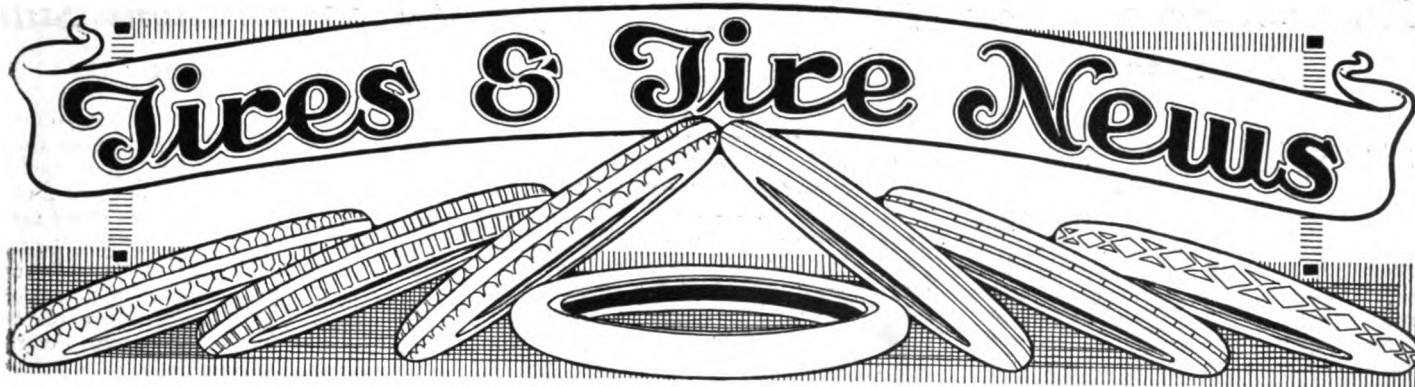
J. R. Aude has resigned as service manager of the Maxwell-Chalmers Motor Co., Brooklyn, N. Y., to become consulting sales engineer for the Valve Rotator Co., Milwaukee, Wis.

Robert L. Ober has resigned his position as service manager of the L. W. Mulford Co. and has joined the sales force of the Turn Auto Corporation, 5 Columbus circle, New York city.

W. A. Evans is now in charge of the New York service station for the Cunningham car, 130th street and Broadway.



Officials of Ray Battery Co., Ypsilanti, Mich.: At Left, Roger P. Fisher, President; Center, Daniel B. Jack, Sales Manager, and at Right, Thomas Lavier, Vice President and Chief Engineer.



## What Price Cut Means to Motorist

According to statistics compiled by the B. F. Goodrich Rubber Co., Akron, O., the recent reduction in the prices of tires and inner tubes will mean a saving to the 8,000,000 American motorists of approximately \$150,000,000. In other words, the country's annual tire bill of about \$1,000,000,000 will be chopped down to \$850,000,000.

An idea of what this saving will amount to can be obtained by remembering that a mile of good hard surfaced, durable highway can be built in most sections of the country for about \$35,000, and that a cross-country road could therefore be built with the amount saved, with quite a few millions left over, enough to build Uncle Sam a first class battleship.

The average motorist's tire bill for a year amounts to about \$125. Next year, because of the reduced prices, \$18.75 will be lopped off this amount. This individual saving does not appear large but when considered that 8,000,000 motorists will save the same amount, the total climbs to a dizzy height.

## RESTRICTED OUTPUT SUPPORTED IN ENGLAND.

The suggested scheme of restricted output of crude rubber on plantations operated by various producers' associations in Malaya, India, Ceylon and Holland has received the necessary support and is reported to have gone into effect Nov. 1. Under the agreement the 25 per cent. curtailment of production will operate until December, 1921. It is pointed out that while the output of rubber has increased five times since 1912, the price has fallen to less than one-fifth of the quotations then ruling. Stocks of rubber in London at the end of September had risen to 30,000 tons.

## NEW RUBBER VULCANIZATION PROCESS.

A new process for the vulcanization of rubber was recently demonstrated at the Manchester College of Technology in India. The treatment of crude rubber mixed with a large proportion of waste

material like leather shavings or sawdust was proved by this method to be chemically possible, as well as a saving in time and cost compared with existing methods. It is claimed that this process will produce a material which will stand the test of wear and weather.

## NEW DEPARTMENT HEADS FOR SYRACUSE RUBBER.

George C. Mecklin has joined the organization of the Syracuse Rubber Co., Inc., maker of Syra-Cord tires, as head of the calendar department, having left a similar position with the Miller Rubber Co.

W. F. Fiske, who has had an extensive experience in the tire building and curing department with both the B. F. Goodrich Co. and the Miller Rubber Co., is the new head of this work at the Syra-Cord factory.

## ROCKHILL A GOODYEAR DIRECTOR.

At the recent annual meeting of the stockholders of the Goodyear Tire & Rubber Co., Akron, O., L. C. Rockhill, sales manager, was elected a member of the board of directors, succeeding J. P. Loomis, retired.



L. C. Rockhill, Sales Manager, Elected to Goodyear Directorate.

## Petition for Goodyear Receivership

One of the recent sensations in the tire and rubber industry was the filing of a suit, on Dec. 18, against the Goodyear Tire & Rubber Co., Akron, O., by Frank S. Monnett, a Columbus, O., attorney and stockholder, for the appointment of a receiver and an accounting, on the ground that the company had sustained heavy losses in recent big transactions, that the fall stock dividend was unwarranted, etc.

President Sieberling of the Goodyear Co. states that the concern is absolutely solvent and calls attention to a plan which will be voted upon by the stockholders on Dec. 24; it is understood, will call for the authorization of a mortgage or deed of trust to secure the payment of not to exceed \$50,000,000 eight per cent. bonds or notes which will be issued. Under the reorganization, it is reported, the company will have an authorized capital of \$100,000,000 seven per cent. preferred stock, which will be exchanged, share for share, for present preferred, and not to exceed 1,500,000 shares of common stock of no par value, which will be exchanged, share for share, for the present \$100 par value common stock.

In a letter to stockholders President Sieberling said in part:

"Sales of the company falling \$45,000,000 below the \$250,000,000 which had been estimated for the 1920 fiscal year, and the necessity for carrying considerable raw material with the curtailment of banking credits, resulted in a strained financial condition.

"The company, however, has been able to arrange, through a banking syndicate, for temporary loans of \$28,800,000, maturing Feb. 15, 1921. Negotiations are under way looking to an agreement in regard to a plan of permanent financing.

"Pending final agreement on such plan, however, it seems necessary to call a meeting of stockholders. Unless necessary action is taken by stockholders before the end of December, it will not be possible for the company to pay dividends accruing Jan. 1 on preferred stock. It is expected that before the date of the meeting final arrangements will have been made with bankers for a definite financing plan which will be presented to stockholders for approval."

## Financial Notes of the Industry

The Fisk Rubber Co., Chicopee Falls, Mass., has voted to pass a dividend of 75 cents a share on the common stock of the company, which was due for declaration at this time. This action was deemed advisable notwithstanding the fact that the company had more than earned an amount equal to this disbursement.

The regular dividend of 1½ per cent. on its preferred stock was declared, payable on Feb. 1 to stock of record on Jan. 21.

"Sales of the company for the year," said H. T. Dunn, its president, "will be approximately \$42,000,000 net, which compares with \$43,000,000 in 1919. While inventories are larger than during normal times, the finished product is composed of standard salable sizes. The company intends to mark down its stocks of all cotton fabrics, rubber and other materials at the end of the year to sound values, and will be able to effect such readjustment out of 1920 earnings and without drawing on the surplus."

### FIRESTONE DROPS DIVIDEND TO SIX PER CENT.

The directors of the Firestone Tire & Rubber Co., Akron, O., have decided to cut the rate of dividend on common stock from eight to six per cent. a year, this affecting the dividend payable Dec. 30. This is in line with the conservative policy adopted by the company to conserve its cash resources during the present readjustment period. Coincident with this announcement, it was likewise revealed that the company would reduce all salaries 10 per cent., effective at once, it being pointed out that salaries were increased 20 per cent. during the past year to meet rising living costs, and now that living expenses were coming down, adjustment in salaries must be made. The wage rates of factory workers have not been reduced, it is said, but the hours of work have been to apportion employment so far as this was at all possible.

### TYER CO. REDUCES WAGES.

The Tyer Rubber Co., Andover, Mass., on Dec. 9, announced a 15 per cent. reduction in wages, effective from Monday, Dec. 6. The cut has been accepted by the employees. Full time, following weeks of a three-day week schedule is a possibility in the near future.

### NORWALK'S PROFITS FOR EIGHT MONTHS.

The Norwalk Tire & Rubber Co., Norwalk, Conn., reports its gross sales for the eight months ending Aug. 31, 1920, to be \$3,048,800, from which there were net profits, after all charges but before federal taxes, of \$703,807. This is at a rate of nearly 10 times the dividend requirements on the \$1,500,000 seven per

cent. preferred outstanding. There is also \$1,000,000 common stock outstanding. Balance sheet as of Aug. 31, shows total assets and liabilities of \$4,684,337, the surplus being \$1,328,325.

### NATIONAL ASSOCIATION TO BE FORMED AT CLEVELAND.

At a recent meeting of the Cleveland Retail Tire Dealers' association at Hotel Winton in Cleveland, it was decided by the officers and members to organize a national association of tire dealers with its probable headquarters in that city.

E. L. Green, chairman of the Better Business Commission of the Cleveland Advertising club, spoke of the influence that a strong national organization has on the welfare of the particular industry or trade represented, and urged dealers to adopt a policy of charging a fair price for goods, neither reverting to cut-throat reductions or adhering to profiteering methods.

### STANWOOD AND HARDMAN RECEIVERSHIPS.

It is reported that receiverships in the cases of the Stanwood Rubber Co. of Elizabeth and the Hardman Rubber Co. of New Brunswick, N. J., have been made permanent. The bond of Edward A. Hayes, receiver for the Hardman Co., has been fixed at \$20,000; that of John Kirkpatrick, receiver for Stanwood, at \$50,000. The plan to combine the two companies is still under consideration.

### LEE RUBBER FINANCES.

In a balance sheet, as of Sept. 30, the total assets of the Lee Rubber & Tire Corporation, Conshohocken, Pa., were shown to be \$6,642,211, a gain of \$1,045,942 over the year previous. The surplus for the year was stated as \$1,039,470, and the net assets applicable to dividends on capital stock were \$5,203,061, or \$34.69 a share.

### TIRE DEALERS TO ORGANIZE.

During the week of the Chicago automobile show, Jan. 29-Feb. 4, a meeting will be held for the formation of a national tire dealers' and vulcanizers' organization to foster the interests of dealers and repair men in the West and Middle West, in which it is stated that there are at least 100,000 engaged in this line of business.

### PENNSYLVANIA RUBBER DIVIDEND.

The Pennsylvania Rubber Co., Jeannette, Pa., has declared a regular quarterly dividend of 1½ per cent. on preferred and 1½ per cent. on common stock, payable Dec. 15.

### MASON CO. BRANCHES.

The Mason Tire & Rubber Co., Kent, O., has opened branches at Portland, Ore., and Los Angeles, Cal.

## Price Reductions Still Continue

Announcement is made by President E. F. Jones of the Republic Rubber Corporation of Youngstown, O., of a reduction in the price of Republic, Grande cord and fabric pneumatic tires and tubes and solid and pneumatic truck tires. Contracts for next year's business are based on this reduction in price.

It is reported that the Republic Co. is gradually increasing its output, more men being put at work daily.

### REDUCTION IN BLACKSTONE PRICES.

The Canton-Blackstone Co., Youngstown, O., through its sales manager, H. J. Woodward, announces a reduction in prices on its line of Blackstone fabric and Canton cord tires.

The company also announces the addition to its line of the Canton cord pneumatic truck tire built to the high standard of its regular Canton cord tires.

### MICHELIN DECREASES PRICES.

The Michelin Tire Co., Milltown, N. J., has reduced the prices of casings and tubes at approximately following rates:

Fifteen per cent. on all soft bead clincher fabric casings; 10 per cent. on the larger size fabric casings; 7½ per cent. on all cord casings and 10 per cent. on all Michelin Ringshaped tubes.

### DROP IN BERGOUNGAN PRICES.

The Bergougan Rubber Corporation, Trenton, N. J., made a reduction in the prices of Bergougan fabric and cord tires effective Dec. 1. On fabrics the cut ranges from eight to 15 per cent., and on cords from 10 to 12½ per cent., according to size. No reductions are made in inner tubes.

### GORDON AND PENNSYLVANIA CUTS.

Two more tire manufacturers who announced substantial cuts, effective the middle of November, are the Gordon Tire & Rubber Co., Canton, O., and the Pennsylvania Rubber Co., Jeannette, Pa.

### REDUCTION ON SYRA-CORD PRODUCTS.

The Syracuse Rubber Co., Inc., Syracuse, N. Y., announces a reduction of 12 per cent. in the price of Syra-cord tires and 15 per cent. on tubes.

### INDIA APPOINTS NEW DISTRIBUTOR.

The India Tire & Rubber Co., Akron, O., recently announced the addition of F. W. Abbott to the list of the company's distributors. Mr. Abbott, who will handle the Minneapolis, Minn., territory, has been connected with the rubber industry in a sales capacity for many years and he has built up a large business in his district.

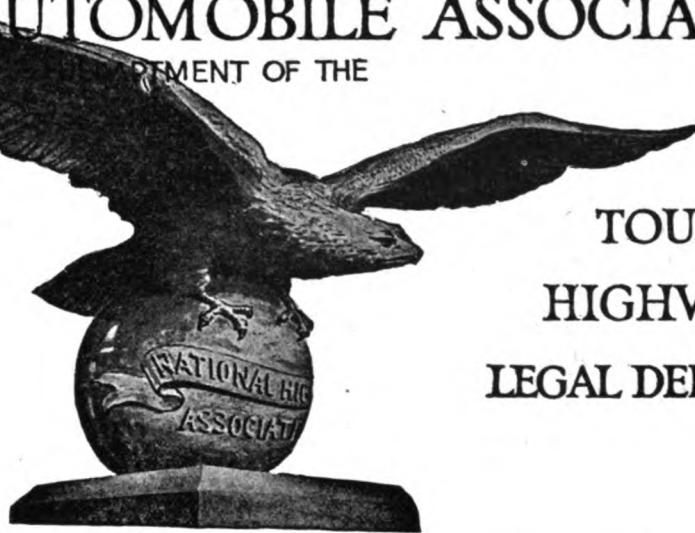


# OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL  
HIGHWAYS  
ASSOCIATION

TOURING  
HIGHWAY  
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

## *Shall All Autoists Be Required to Give a Bond?*

"NEW times demand new measures," says Lowell, and it may be that times have changed so that it is time for automobile associations to advocate new measures for public protection and particularly for the protection of the responsible driver from the reckless road hog. We speak at this time with particular reference to Massachusetts. On the first day of December there were, in round numbers, 300,000 motor vehicles of all classes registered in Massachusetts.

We have been reading in the papers of late of material reductions in the price of various cars and the various parts and accessories that make up their equipment, and it may be predicted that rock bottom has not yet been reached. However, with a general revival of business in the spring we can safely assert that there will be a tremendous increase in the number of cars on the highways.

Shortly now the open season on law making will arrive and we may be assured that the individual who thinks that every ill to which humanity is heir can at least be assuaged, if not completely cured by passing a law, will be on hand with the convening of the Legislature, armed with numerous and sundry bills to be enacted into law. The motorist is sure to receive attention from these gentlemen.

We may be sure, at least, that the hardy annual dealing with bonding motorists will be with us in some form. We want to discuss this particular measure with our members in this issue. In our discussion we do not have any particular bill in mind, for its advocates are not all agreed, but we wish to discuss simply the general proposition as to whether or not it is advisable to enact into law at this time the proposal that all motor-

ists shall either be insured or give bond in a sufficient amount to satisfy any and all damages that they may cause by the operation of their automobile upon the highways, whether such damage be to pedestrian or to another automobilist. This proposition has been before the Massachusetts Legislature in one form or another for several years and much has been said both in favor of and against it. Perhaps the three principal arguments against these measures are:

First, that it is a hardship to compel the man of small means who has purchased a car to take out insurance or give a bond at considerable cost.

Second, that when a man knows he is protected against any possibility of financial loss due to his own carelessness, he tends to be less careful in the manner of operating his car.

Third, that inasmuch as insurance and bonding companies have the right to determine whether or not they will take

the risk of insuring any particular individual, it in effect puts into the hands of these companies the power to say who shall operate a motor vehicle and takes it away from the state licensing board.

### Argument for Proposition.

The principal argument for the proposition is that the reckless driver is the one who has no financial resources; who owns a cheap and inexpensive car and who takes the attitude that, no matter what happens, they cannot get anything out of him. This man is a menace, not only to the pedestrian, but also to every other motorist on the road. In this connection it is significant that the statistics of accidents now being compiled by the Public Works department of Massachusetts show that the greatest number of accidents are those in which the lower priced cars figure.

There are, of course, many difficulties in the way of perfecting such a measure such, for example, as making it ap-

### APPLICATION BLANK

BLUE  
BOOK

NATIONAL AUTOMOBILE ASSOCIATION  
New England Department  
NATIONAL HIGHWAYS ASSOCIATION  
9 PARK STREET, BOSTON, MASS.

The undersigned hereby applies for membership in the National Automobile Association, New England Department of the National Highways Association.

Enclosed herewith you will find check for \$5.00.

If you wish the Blue Book sent to your address, add 15 cents to the Membership Fee for packing, insurance and postage.

Name..... Telephone.....

Address..... City..... State.....

Make of Car.....

Checks MUST be made payable to the National Automobile Association.

ply to out-of-the-state motorists, of whom there are a host during the summer season. But this article does not purport to deal with such matters, but only with the general proposition itself.

We believe that if the proposition is a good one some means of working out the mechanical difficulties can be found and we believe that it is time that the motorist should be active in furthering some such legislation instead of opposing it. There is too much of one class of citizens seeking to get something from another class or at the expense of another class, and we believe that, in this case, the motoring class should not differentiate itself from the other users of the public ways, but should be the leader in furthering all legislation and all means which will tend to make the public highways of the commonwealth safe, not only for itself, but for every man, woman and child throughout the land.

We believe that the National Automobile association should do all in its power to assist in framing a proper law; that it should call upon its general counsel for this purpose, and that it should have the hearty and enthusiastic support of its entire membership to this end. We believe that practically every motorist who is financially responsible is already insured for his own protection and that the only persons who really object are those who wish to shirk the responsibility for their misdeeds.

#### Answer to First Argument.

To the first argument against the proposition we answer that while it is true that the automobilist has the same right to use the highways that the pedestrian has, nevertheless, he has under his control a dangerous and powerful machine and if he is unable to settle for damage caused by his improper or negligent operation thereof, he ought not to have a machine at all.

To the second argument we answer that willful neglect on his part can be done away with by the knowledge that he cannot get insurance if he is known to be a careless driver, disregarding of the rights of others.

And to the third we answer that this can either be remedied by a state insurance company, or by some proper regulation, making it incumbent upon insurance companies doing business in this commonwealth to accept the license of the Commission of Motor Vehicles as a certificate that the holder of such a license is a fit person to receive insurance.

#### Opinions Asked.

However, the writer of this article is merely an officer of the National Automobile association and as such he can do nothing without the assured support of all its members. We, accordingly, ask all our members to write us giving a full and frank expression of their ideas on this important question, giving their reasons for and against it. This is your association and the opinion of the majority of the members should have the support and encouragement of its officers, who are your servants. We believe that it is better for the motorist himself to rem-

edy a condition voluntarily which is rapidly becoming intolerable, than to suffer it to be done by outside, hostile agencies.

We should also be glad to receive an expression of opinion from all readers of the Automobile Journal, whether members of the N. A. A. or not. Membership, however, will give greater force to your argument and we urge upon all our readers the advantages of membership, both in direct, material return, and from the fact that your membership gives both you and our association a wider influence and, therefore, helps toward making the highways and byways of New England safe for everybody.

#### MASSACHUSETTS' NEW REGULATION.

The Massachusetts Commissioner of Motor Vehicles has recently made a regulation, to go into effect in 1921, which has been in force in Connecticut for some time. This has to do with the issuing of operators' licenses to all new applicants. All persons applying for the first time for a license to drive a motor vehicle must pass an examination before they receive such a license. The charge for both examination and license is \$4. Examinations will be held frequently, and in different cities throughout the state, so as to cause as little inconvenience to applicants as possible. This applies only to new drivers, and all old licenses will be renewed without examination, as it is assumed that all persons now in possession of a license are fully able to drive by the time their license expires. It is hoped that this new regulation will do much toward clearing the highways of incompetent operators, who at present are a source of real menace to all careful automobilists.

## The Question of Tax Revision

The recent recommendations of Secretary Houston to Congress for what he characterizes as a more equitable and just distribution of America's \$4,000,000,000 tax burden has occasioned unusual interest throughout the automobile industry and trade inasmuch as several of the proposed measures directly concern every manufacturer of, dealer in, owner or user of a motor vehicle. These specific recommendations are as follows:

A tax of two cents a gallon on gasoline for motor cars and all other purposes, to yield \$90,000,000.

A federal license tax of 50 cents per horsepower on the use of motor cars to yield \$100,000,000.

Secretary Houston also suggests in addition the following sources of increased income:

A tax of 20 per cent. on corporation profits, distributed or undistributed, in addition to application of a higher surtax rate to yield \$690,000,000.

An additional tax of six per cent. on corporation incomes to yield \$465,000,000.

Readjustment of surtax rates on in-

comes to yield an additional \$230,000,000.

Abolition of the \$2000 exemption allowed corporations on incomes, to yield \$58,000,000.

An increase from the present four per cent. to six per cent. in the tax on incomes of \$5000 or less, and from eight per cent. to 12 per cent. in the tax on incomes between \$5000 and \$10,000, the whole estimated to yield \$150,940,000 annually.

A 10 per cent. additional tax on theatrical admissions to yield \$70,000,000.

He also advocates:

Heavy additional taxes on cigarettes, cigars, tobacco, snuff, chewing gum, toilet powder, jewelry, musical instruments and moving picture films.

Substitution of 10 per cent. tax on manufacturers, producers or importers of perfumes, cosmetics and medicinal articles, in place of present tax on consumer.

Abolition of tax on soda fountain and similar beverages.

#### Measures Are Strongly Protested Against.

As might naturally be expected, Mr. Houston's proposal's to Congress have been received with strong protests throughout the industry. This feeling was well voiced by Alfred Reeves, general manager of the National Automobile Chamber of Commerce in an address to the members of the New York Automobile Dealers' association, immediately following the announcement of Mr. Houston's recommendations. He said, in part, that such measures, if incorporated in the tax laws, would increase by 100 per cent. the taxes now paid by motor car dealers and manufacturers. He added that the automobile industry is paying \$143,000,000 annually to the federal government, with state fees of \$64,000,000, and personal property taxes and other fees of \$50,000,000.

He characterized as an injustice any additional taxes on owners, dealers and manufacturers of motor cars. Farmers own one-third of the 7,200,000 passenger machines in the country, he declared, and more than 100,000 doctors use the motor car as a means of conveyance.

The speaker asserted that although the motor business is now running at less than a 50 per cent. basis, the full year's production will exceed all records, approaching 1,900,000 cars and 340,000 trucks.

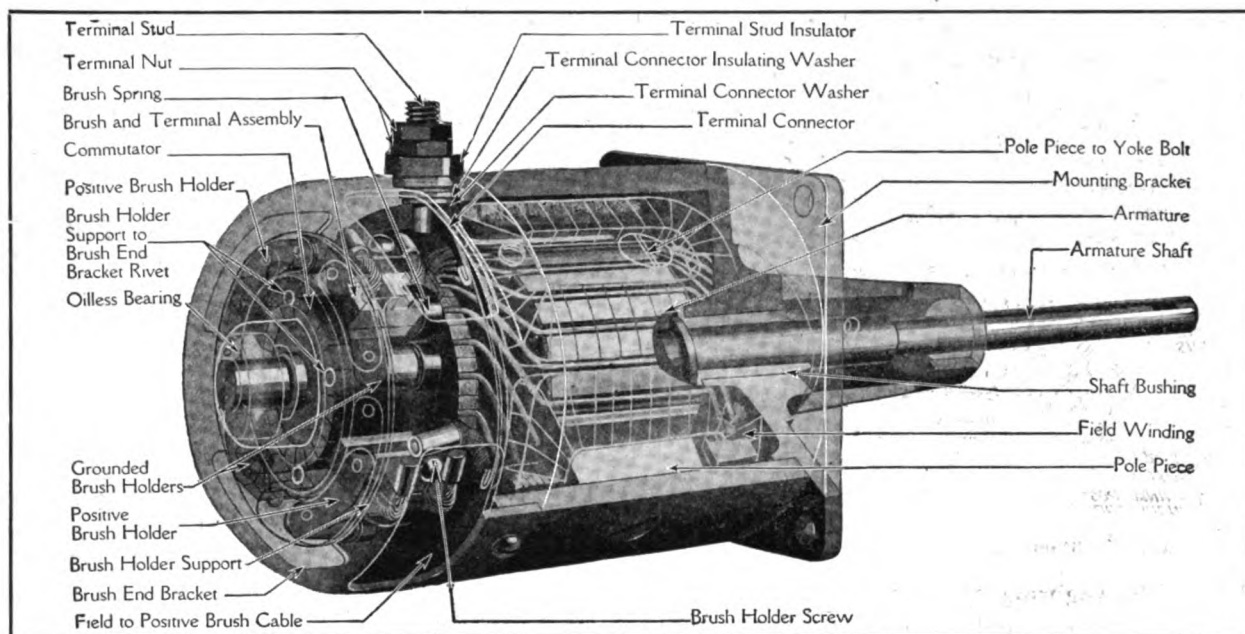
Citing as proof of the necessity of the motor car to business and transportation, he said motor car mileage in 1919 exceeded 22,000,000,000 miles, with a total passenger mileage averaging three passengers per car in excess of 66,000,000 miles.

#### Criticism in Detroit.

Automobile manufacturers in Detroit asserted that the imposition of \$290,000,000 additional taxes on the automobile industry at this time, as suggested in Secretary Houston's report, would paralyze the industry.

Henry Ford declined to make a statement on the grounds that Mr. Houston's recommendation did not demand present action.

## FORD STARTING AND LIGHTING SYSTEM



Phantom View of Starting Motor.

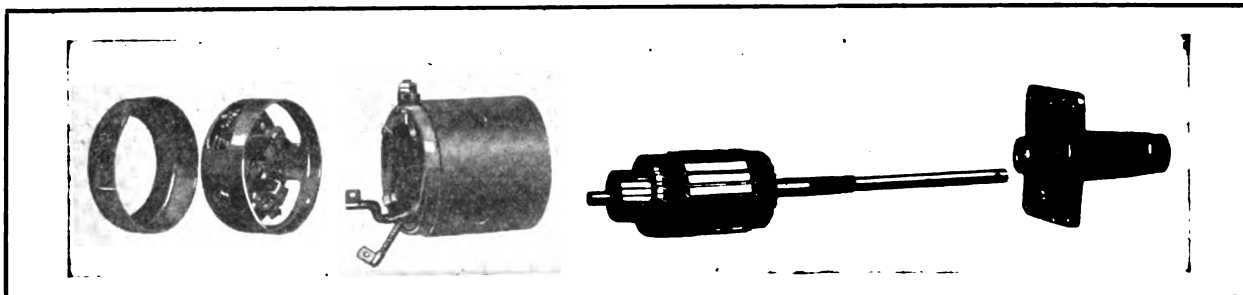
(Continued from November Issue.)

After the Bendix drive has been removed it may be further disassembled by taking out the screw which holds the spring to the drive sleeve.

The sleeve and gear should be inspected to see that the gear runs freely the full length of the thread and that the balance collar is tight on the gear. The spring guide in the drive head end should turn freely in the sleeve and be free from burrs. The spring should show equally spaced coils, and offer a strong resistance to twisting. The drive head should be free from burrs.

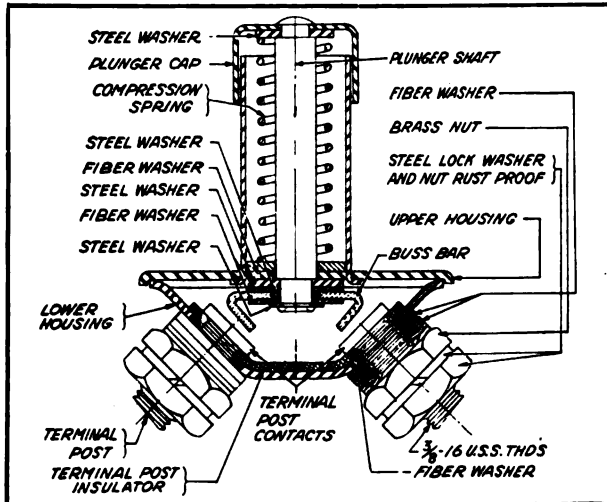
If the Bendix drive has been disassembled the first step in replacing it is to attach the spring to the sleeve. As bending the ears of the washer back ruptures the metal, a new washer should be used in assembling it. One ear of the washer is

bent down; this should be inserted between the end of the spring and the coil, as shown in Figure 26. When the screw has been tightened into place, the other ear is bent up against one of the flat sides of the screw head. This assembly is then slipped on to the armature shaft, which extends through the opening in the rear of the gear-set cover. The Woodruff key is next set in the keyway of the shaft, after which the drive head is slipped on, forcing it forward until the set screw hole in the head indexes with the anchor hole in the shaft, the lugs on the head entering the slots in the spring guide on the Bendix drive sleeve. The Bendix drive is then turned around until the spring lines up with the hole. The set screw with a new washer is then secured, as explained. Next assemble the cap and gasket to the gearset cover, completing the assembly.



Starting Motor Disassembled, Showing Order of Assembly.

## LIGHTING AND IGNITION SWITCH.



Section View of Starter Switch, with Components Named.

## The Lighting and Ignition Switch.

The lighting and ignition are controlled through a combination switch located in a panel on the instrument board. There are several designs and makes of switches used, but the indexing and principle of operation is the same in all. Some earlier switches were assembled separately, but later ones are made integral with panel.

The lights are controlled by means of a lever (see Figure 25), short index on the upper end of which is brought to the indication of the condition required. The lights are operated on current from the battery only, while for ignition, current from either the battery or the magneto may be used. The ignition is operated by inserting a key into the barrel in the center of the lever and turning it to either "battery" or "magneto" as the choice may be.

If trouble is indicated in the switch, first remove and examine the wire connections, comparing them with the wires shown in the wiring diagram Figure 1. It is good practise to disconnect the battery from the terminal block wire, see Figure 26, before removing the switch, to prevent grounding the battery. The terminals on the back of the switch are marked, as shown in Figure 27, so that it is a simple matter to make certain that the proper connections have been made. If the connections are correctly made, all the wires should be disconnected, the switch being removed to the bench and tested.

## Testing Ignition Connections in Switch.

Hold one wire of the six-volt test lamp on the terminal marked "Magneto" and turn the switch key so that it indexes with "Magneto;" try the other wire on the terminal marked "Coil" and the

light should show. Next try the 110-volt lamp, holding one wire on the "Magneto" terminal while the other wire is touched to each of the other terminals and the metal of the case. There should be no light excepting when the "Coil" terminal is touched. In the same manner test the battery circuit, turning the switch key to the "Battery" side using the "Battery" terminal instead of the terminal marked "Magneto."

## Testing Lighting Side of Switch.

Next try the lights: Turn the lever to "Dim" and with one wire of the six-volt test lamp on "Battery" terminal, touch the "Tail" lamp and the dim terminals. In each case a light should show. Now with the 110-volt lamp, try the "Battery" terminal with the other terminals as explained above. No light will show if the switch is in proper condition. In the same manner test the "Bright" light system, turning the lever to the "On" position, the test now being made on the "Tail" and "Head" lights instead of the "Dim" and "Tail" terminals.

Finally hold one wire of the 110-volt test lamp on the "Ground" terminal and try the other terminals in each of the three positions of the ignition. The only one which should show a light is the "Coil" when the switch is in "Off" position.

The "Coil" to "Ground" terminal should also show a light on the six-volt test lamp with the key in the "Off" position. If the trouble is found to be in the switch the entire panel should be replaced, as repaired switches are generally unsatisfactory.

When it is necessary to install a new switch the ammeter should be removed from the old panel and inserted in the new one. Connect the wires to the back of the assembly and the battery wire in the terminal block. Try the switch in its

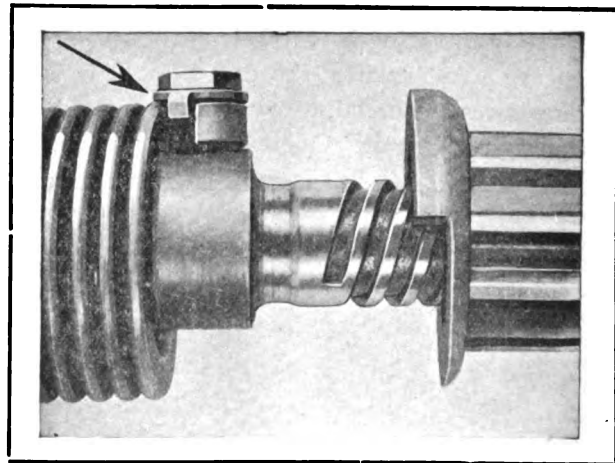


Figure 24. Arrows Indicates Lock Washer Which Prevents Loosening of Screw Holding Bendix Spring to Sleeve.



### REMOVING THE STARTING MOTOR.

several positions to prove that the wires have been properly connected. When the wires check up properly, install the panel in the instrument board.

#### Removing Starting Motor from Engine.

On account of its construction, it is somewhat more difficult to reline the bands of the transmission of a Ford car equipped with a starting and lighting system than where the system is not used, as the cap which fits over the Bendix drive head is located close to the foot pedals which control the action of the brake and gearset bands. If it is necessary to remove the motor from the engine or to reline the gearset bands, the starting motor will have to be taken out of the engine.

The first step is to remove the engine pan, on the left side under the engine; with a screw

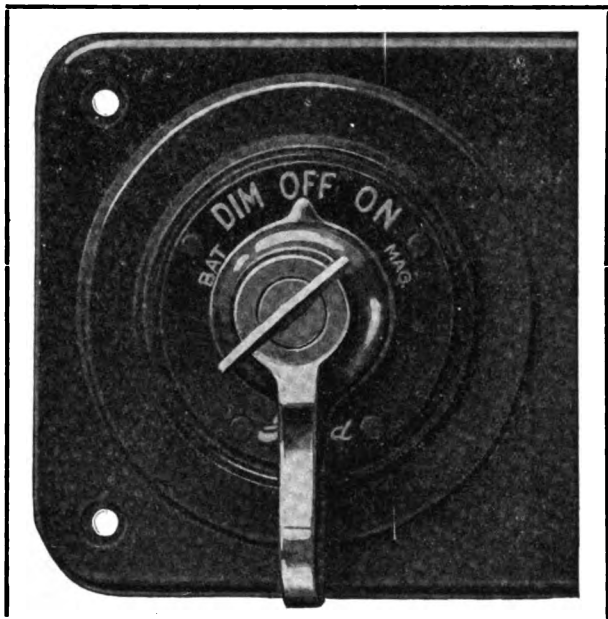


Figure 25, Front View Starting and Lighting Switch Located on Dash of Car.

driver take out the four small screws holding the shaft cover to the gearset cover. Be careful not to break the gasket. After this is removed turn the Bendix drive shaft around so the set screw on the end of the shaft is in a horizontal position. Under this set screw is a lock washer, provided with lips; one of these is turned against the collar and the other is turned up against the set screw head. Bend this latter lip back and remove the set screw. Pull the Bendix drive assembly out of the housing, being careful that the small key is not lost. Take out the four screws that hold the starter housing to the gearset cover and pull out the starter, taking it down through the chassis, this is the reason the engine pan was taken off. If for any reason the generator has

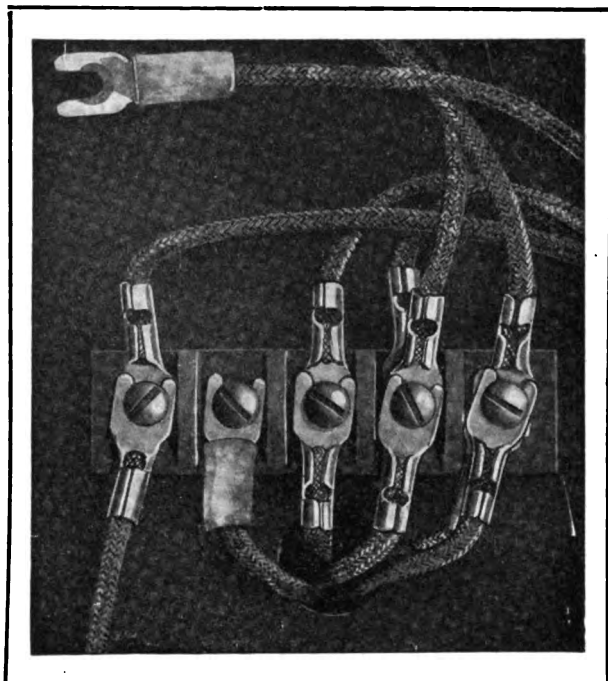


Figure 26, Showing Battery Wire Disconnected at Terminal Block, Allowing Work on Switch or Connections.

to be removed first take out the three cap screws holding it to the front end cover and by using the point of a screw driver between the generator and the front end cover, the generator may be forced off the engine assembly. Start at the top of the generator and force it backward and downward at the same time.

(The January Issue Will Take Up the Care and Maintenance of the Battery.)

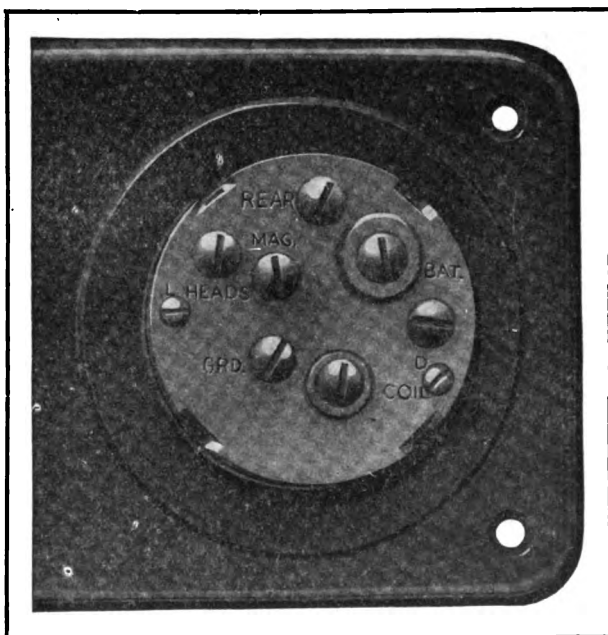
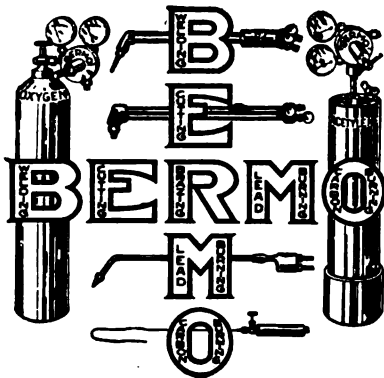


Figure 27, Rear View of Starting and Lighting Switch, Showing Connection Screws Plainly Marked.

# ACCESSORIES DEPARTMENT

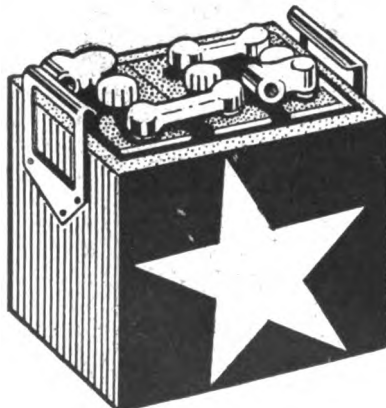
**Bermo Welding Apparatus**, for 16 years a well known product, is claimed to have reached a degree of efficiency which is the result of experience and experimentation and that practically all kinds of welding, cutting, lead burning, brazing and decarbonizing can be done at a minimum of time and expense. The manufacturer is in receipt of many letters of



recommendation, all of which tend to show the general usefulness of the different products. All Bermo apparatus is guaranteed for one year and liberal terms of credit are given which enable the purchaser of a Bermo plant to pay for it from the profits of the business.

Manufactured by Bertschy Engineering Co., Cedar Rapids, Ia.

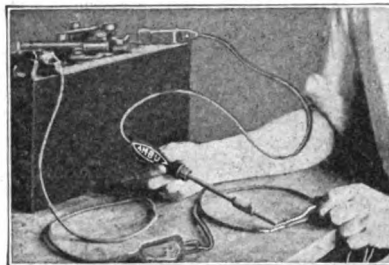
**Star Storage Batteries**, designed to meet every emergency to which a storage battery may be subjected, are made of the best of materials, of rugged design and handsome finish. Claim is made that all parts of these batteries are made, in-



spected and assembled by the manufacturer, and that no part is accepted until it has passed an especially rigid test. Car owners who have used the Star batteries are said to speak highly of their general efficiency and high class workmanship.

Manufactured by the Star Storage Battery Co., Muncie, Ind.

The **Ambu Solder Iron** complete, consists of three feet of rubber covered braided wire with clamp for attaching to battery, a three-foot connecting wire with two clamps, six carbon points, a piece of wire solder and one two-ounce can of

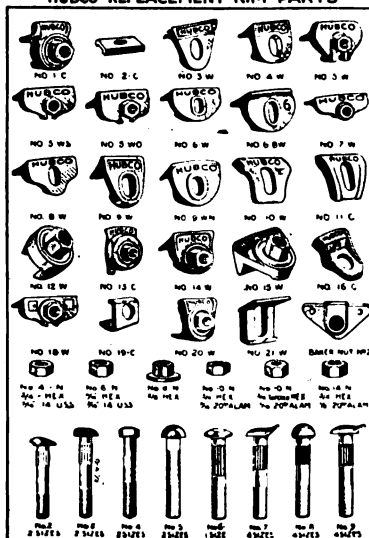


Ambu solder paste. It is designed to work wherever there is a storage battery, and, therefore, can be used in the shop, the car or the garage. It is unique in that it wastes no current because none is used except at the instant of soldering.

Manufactured by American Bureau of Engineering, Inc., Chicago, Ill. Retail price, \$5.

**Hubco Replacement Rim Parts** are said to be made in such manner as to eliminate all annoying squeaks and rattles when fitted to the car. The claim is made that properly annealed malleable iron is used, which does away with any wear on the rim, the idea being that it is better to have the wear come on the parts than on the rim. All parts are galvanized with a heavy double coating of galvanized iron, and are said to be absolutely rust proof. An interesting feature of the marketing of these parts is the dealers'

"HUBCO" REPLACEMENT RIM PARTS



specification sheets, which are laid out in such manner as to make it practically impossible for the wrong parts to be supplied to a customer. The line includes wedges, clamps, bolts and nuts for all makes of cars.

Manufactured by the Baltimore Hub Wheel & Manufacturing Co., Fallsway and Gay Streets, Baltimore, Md.

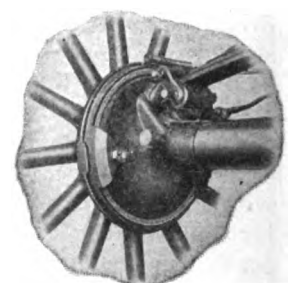
**Gimlet Bit Sets**—This set consists of 12 bits, 1/32 to 12/32 inches, put up in a round wooden box. Each bit is hand



forged from crucible steel, carefully hardened, oil tempered and sharpened by hand.

Manufactured by Goodsell-Pratt Co., Greenfield, Mass. Price, complete, per set, \$2.50. Weight, 1 1/2 pounds.

The **Moore Rear Wheel Service Brake** for Ford Cars is a full wrap contracting brake, acting directly on the original Ford brake drums. It is operated from the original brake pedal, the Ford transmission brake band being disconnected

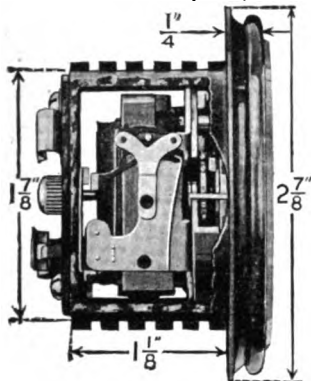


and not used. Claim is made that it is positive in its action and can be applied gently or in such manner as to lock the wheels. There are no loose parts to rattle, and materials are used which seem to indicate that it will give thousands of miles of service.

Manufactured by Tractor-Train Co., Connersville, Ind. Prices: Model 100, for passenger cars and all Model T chassis, \$20 plus 75 cents excess tax. Model 200, for one-ton worm drive trucks, \$40, plus \$1.50 tax. F. O. B. Connersville, Ind.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Connecticut Electric Clock was specially designed to meet the demand of the automotive industries for a time piece automatic in operation, needing no attention, and accurate under variable conditions. It has a finely adjusted seven-

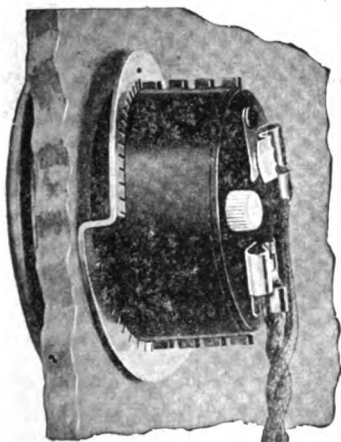


jeweled movement and in offering it to motor vehicle users the company does so with the positive knowledge that its value as an accurate, durable and simple time piece is beyond question, and that its merits will commend it to the thoughtful purchaser.

Simplicity is the keynote of construction in the Connecticut electric clock. All adjustments are of a permanent nature and will not get out of order. The con-



tact points are of pure coin silver, and so mounted as to prevent arcing and corrosion. When connected with the storage battery a finely constructed coil spring is automatically tensioned to give the movement the exact power necessary for a proper beat of the balance, and being replenished electrically each minute, causes a constant spring tension, thereby effecting an excellent rating and a minimum of wear.



The materials used in this clock are of the very highest quality obtainable, and expense has not been a factor in developing it to make it the most reliable of automobile time pieces.

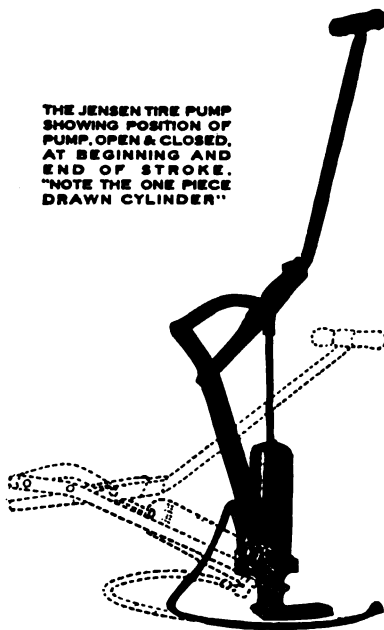
The case is of flange type to allow the use of a small dial and a small body, is dust proof, extremely compact and fitted

with the Connecticut lock ring, which prevents it from jarring loose—no need of unsightly screws and nuts. The terminals on the back of the case are of a spring construction, which eliminates any possibility of becoming loose and insures a positive circuit. The setting knob is located on the back of the case, where it is not liable to be tampered with, but is at the same time easily accessible when actually needed for setting. The fiber washer at the back of the case completely protects it from short circuits. It is stated to be economical in current consumption, using less current in a year than a dash light in one hour.

Manufactured and guaranteed by the Connecticut Clock Co., Hartford, Conn. Price, \$18; with luminous hands and dial, \$2.50 extra.

The Jensen Tire Pump is designed to fill the demand for a pump that will inflate tires without back-breaking effort and physical exhaustion. It operates on the well known fulcrum and lever principle which actuates against a 90-pound pressure with less effort than the ordinary pump against a pressure of 65 pounds. It is stated that one-half the number of strokes are required to inflate a tire and that it is accomplished with one-third less energy on the part of the operator.

THE JENSEN TIRE PUMP SHOWING POSITION OF PUMP, OPEN & CLOSED, AT BEGINNING AND END OF STROKE. "NOTE THE ONE PIECE DRAWN CYLINDER"



The pump is constructed almost entirely of steel and is machined to fit accurately, is equipped with a ball check valve at the outlet of the cylinder, which prevents back pressure, while the 7/16-inch piston is made of cold rolled steel. The plunger is made of oil seasoned oak leather securely fitted inside of the cylinder chamber and fastened to the end of the piston by means of a threaded and reinforced plunger case with a metal washer and machine turned lock nut riveted tight. The cylinder is a one-piece drawn type insuring, it is claimed, absolutely air tight compression under all conditions.

Manufactured by the W. H. Howell Co., Geneva, Ill., Price \$6; fitted with pressure gauge, \$7.35.

The Reliable Battery Filler is designed especially for the service station which is called on to supply many batteries during the day with distilled water. The device is provided with a rubber tube fitted with hard rubber end for filling batteries, and a catch on the side member of the frame holds the tube when not in use, preventing leakage.

A bracket is also provided for the hydrometer used in testing the solution, while a handle is fitted at the top by which the filler is carried. The container

consists of a large glass bottle, which is held inverted in a frame work of steel bands, the connection to the tubing being made through the base or stand. It is stated that the metal of the frame does not come in contact with the contents of the bottle and that any gallon

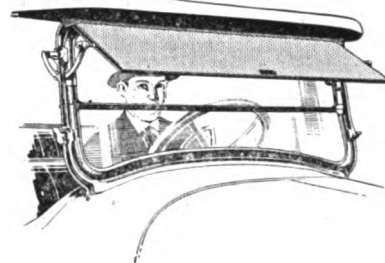


bottle will fit the device. This filler provides a quick and easy means of testing and filling storage batteries.

Manufactured by the Reliable Manufacturing Co., Cleveland, O. List price, \$5; discount to the trade.

The Doty Shield Visor is an adjustable shade fitted on to the windshield, made in sizes to fit any open, as well as some closed cars, and enables the car owner to have a convenience that is becoming standard equipment on some of the higher priced limousines. It will shut out the lights of other cars by night, giving a clear view of the road ahead. In the day time it eliminates the glare of the sky and sun's rays, relieving eye strain. During a rain or snow storm it keeps the windshield clear so that the driver can see the road ahead. It is also claimed to add to the appearance of the car.

The Doty Shield Visor is not built like an awning, but over a strong, well shaped, rigid frame, which conforms to the shape of the top. This frame is covered with a fine quality of black, long grain top ma-



terial, while the under side covering has a green Spanish leather finish. The metal parts are black enamelled and nickel plated.

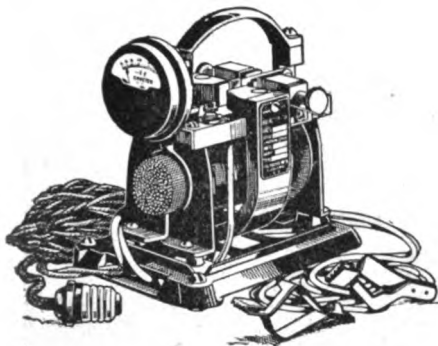
The Doty Shield Visor can be attached in five minutes, it is stated, no drilling of holes or altering of the car in any way being necessary. It will not rattle and is guaranteed to withstand the strongest wind.

When ordering the make, model and year of car should be stated, or the exact length (inside the frame) of the upper windshield glass only, may be given.

Manufactured by Auto Radiator Shutter Co., Dayton, O. Sold to dealers through jobbers by distributors.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

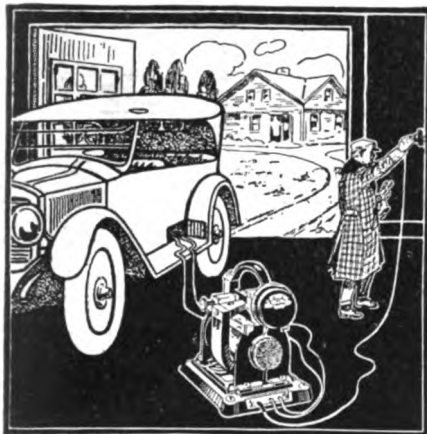
The F-F Battery Booster is designed to furnish an efficient and satisfactory means for charging all types of storage batteries from alternating current. This device uses both sides of the wave of the alternating current, rectifying the positive and negative alternations through copper and carbon electrodes which, it is stated, are



inexpensive and durable and cannot burn, break or depreciate on account of the infusibility of the carbon.

The essential parts of the mechanism are the transformer and rectifying unit. The rectified charging current delivered is an interrupted, pulsating direct current, the heating effect of which is stated to be less than with the straight direct current; therefore, charging can be done at a higher rate in less time. The upkeep is negligible as the carbon brushes are adjustable for wear simply by turning a thumb screw, and are claimed to be good for thousands of hours of service.

The F-F Alternating Current Battery Booster or Magnetic Rectifier is also stated to give the proper "taper" of



charge. Its operation does not depend in any way upon the condition or state of the charge in the battery. It is entirely automatic and needs no fixed conditions of installation, constant attention or expert knowledge. The expense of operation is said to be no more than the cost of burning an electric light for a few hours. It is convenient in that the outfit can be readily transported and attached to the battery wherever located. All that is necessary to be done is to screw a plug into a lamp socket and snap the two charging wires on to the battery terminals.

The alternating current F-F Battery Booster is equipped complete with ammeter, long extension cord and plug, heavy charging wires and battery clips. The dimensions are five by seven by seven inches for types 16 and 112, and five by seven by nine inches for other types.

The same company also manufactures a combination of rectifier and carbon rheostat and F-F panel rectifiers in a number of types, as well as the F-F Battery Booster or charging rheostat with current regulator for use on 24 to 220-volt farm lighting plants, or direct current circuits.

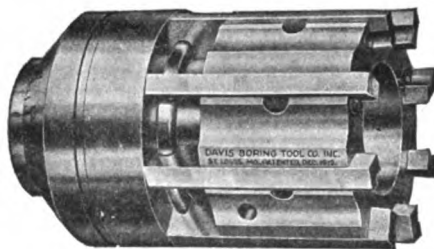
The company fully guarantees the F-F Battery Booster for workmanship and performance.

Made by the France Manufacturing Co., Berea road and West 104th street, Cleveland, O. Prices: Type 16, which charges one six-volt battery at a rate of eight amperes, \$24; type 112, for one 12-volt battery at a rate of six amperes, \$24; type 168, for one six-volt battery at a rate of 12 to 15 amperes, \$32; type 1612, for one 12-volt battery at a rate of seven to eight amperes, \$32; type 1626, combination outfit, for charging either six or 12-volt batteries at a rate of 12 or seven amperes, \$48. These prices are for 110 or 220-volt circuits and for frequencies of 60 or 50 cycles. The voltage and frequency must be specified when ordering as the machines do not operate interchangeably on 110 and 220 volts or 60 and 50 cycles. When not specified, 110-volt, 60-cycle rectifiers will be sent. For 40, 30 or 25-cycle current, add \$8 to above prices, except for types 16 and 112, which are made only for 60 or 50-cycle current.

The Davis Expansion Reamers have as distinguishing features, simplicity and practical construction, with the minimum number of parts, it is claimed. The blades are positively controlled by an accurate micrometer adjusting dial, graduated in quarter thousandths, which acts for both expanding and receding of blades. The blades are slotted and fit over the ring on the adjusting dial, which prevents their movement either way, without turning the dial. When the reamer is set to the size required the blades are individually and doubly locked to the reamer body by a locking principle which positively secures the blades without the use of individual blade screws, virtually making a solid reamer.

It is pointed out that the elimination of screws for holding the blades in a reamer body is a distinct advantage. The blades are held with a hardened pin, which is fitted to the reamer body on special taper with line contact only in groove in the blade, resulting in a constant downward and lateral thrust that firmly holds the blades under all conditions. Blades are clamped to the reamer body with the locking ring threaded on the adjusting dial, making it impossible to expand or recede the blades either by accident or carelessness without releasing the locking ring, which must be done before the expanding dial can be turned in either direction.

This reamer is stated to represent the first application of the principle of the forward movement of blades for the purpose of expansion in a tool of this type. This feature always keeps the blades cutting in advance of the tool body; consequently they never lose their bottoming



feature. The movement of the blades is positively controlled by the adjusting dial, which expands or recedes them. They have liberal expansion, with one-quarter thousandth adjustment and the locking of the blades is absolute and positive.

Among the distinctive features of Davis Expansion Reamers is simplicity of driving, which eliminates the necessity of making costly arbors. Any size can readily be applied without interfering with the driving shank. True alignment is assured when assembled in multiple form, virtually making a solid line reaming bar.

Blade efficiency and the cost of blades is

an important factor which should be considered in connection with any adjustable reamer. Davis Expansion Reamers, it is stated, require but three groups of blades to cover a range of sizes from 1½ to six inches inclusive. When the blades for a six-inch reamer are worn under size they can be used in 32 smaller sizes down to and including four inches. Blades for a 3 15/16-inch reamer can be used in 23 smaller sizes down to 2½ inches. Blades in a 2 7/16-inch reamer can be used in 15 smaller sizes down to 1¼ inches. This wide range of adjustment permits reaming the maximum number of holes to a set of blades.

These tools are made either in the shell type or with a solid shank, straight or taper, to which a floating holder can be applied. All wearing parts are hardened and all threaded parts are protected from dust, chips or possible injury which might result from careless usage or accident.

Manufactured by the Davis Boring Tool Co., 3718-24 Forest Park Boulevard, St. Louis, Mo. Prices and literature on request.

Universal Gaskets were designed to meet the demand of manufacturers and dealers for a first class gasket. They are of copper with an inner section of asbestos and are guaranteed to prevent the leakage of either gas or water. Universal gaskets are stated to be made of high

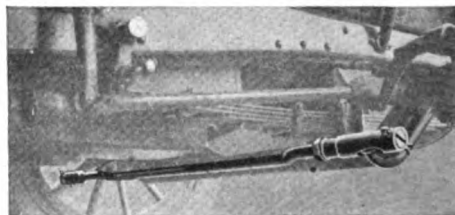


No. 1009 Hudson Super Six

grade material throughout and to stand up under the hardest usage. They are manufactured in all styles and shapes for regular and special work about the gasoline engine.

Manufactured by the Universal Gasket & Manufacturing Co., 2901 South 48th avenue, Cicero, Ill. Prices and literature on request.

The Cincinnati Drag Link is designed for use in passenger cars and trucks and offers special features which should recommend it to manufacturers and service station owners. It is made of the highest grade of material throughout and spe-



cial features are embodied in it the manufacturer claims, so that when once filled with lubricant no further attention is required for a year.

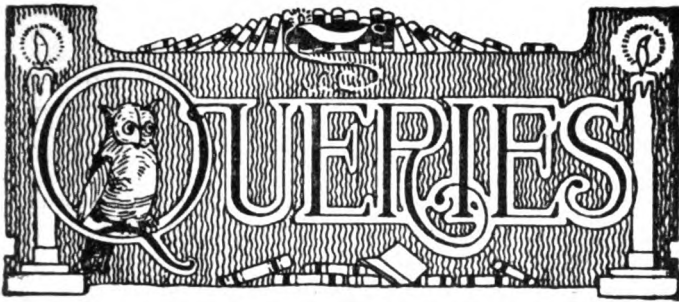
In the self-lubricating link a long wick is drawn through plugs at either end of the tube, and no matter in what position the link may be placed it is claimed that there is a constant flow of oil to the working parts, while the end grease cups deliver the lubricant directly to the wearing surfaces.

In a drag link which has been adapted to light vehicles, the connecting rod is upset into the sockets at the end to eliminate the weld. The sockets, while held firmly in place by spring pressure, are free to revolve slightly. This provides for the side motion of the steering arm which otherwise might injure the sides of the socket.

Manufactured by the Cincinnati Ball Crank Co., Cincinnati, O. Prices and literature on request.

(When Writing to Advertisers, Please Mention the Accessory and Garage Journal.)





WIRING DIAGRAM FOR BUICK C 37 CAR.

(J. H., Ashley, Pa.)

What is the probable cause when the generator does not seem to turn the engine fast enough to cause it to fire, but makes a grinding noise and stops?

Please let me have a correct wiring diagram for a Buick C 37 car? The wiring of this car has been changed and is not satisfactory, and I want to have the wiring restored.

Generally if the motor or motor generator fails to crank the engine so it will fire, or should it start and stop before sufficient engine speed is reached, the cause may be any one of the following, which can be determined by examination:

Brushes making poor contact; brushes worn short; commutator dirty, rough or grooved; armature short-circuited or grounded; field short-circuited or grounded; high resistance in field circuit; field connected wrong.

Restoration: Fit ends of brushes seating on commutator with strips of 00 sandpaper, cut slightly wider than the brushes, drawing the strips with the sand sides against the brushes. The contour of the brushes should be such that the entire brush surface should bear on the commutator. The spring pressure against the sandpaper will be sufficient. If the brushes are much worn, or should the holders touch the commutator, replace them, fitting with sandpaper as described.

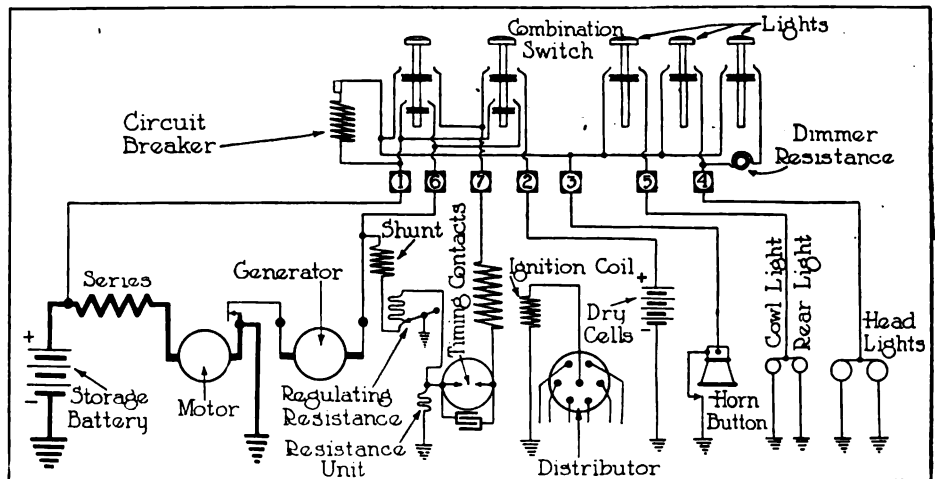
If the commutator is dirty, rough or grooved, it may be cleaned by holding against it a clean cloth slightly oiled (not saturated) or coated with vasoline while the armature is turned. If the oiled or greased cloth does not remove discoloration, use 00 sandpaper, holding the paper with the sand side against the commutator, with the brush pressure against it. Then run the motor until the commutator is worn bright, after which it should be wiped with a clean cloth and examined for particles bridging the insulation between the segments. If the commutator is very rough or grooved it should be placed in a lathe and a very fine cut made off the segment surfaces. The mica insulation between them may be even or above the surface. The mica must be cut at least  $1/64$  and not more than  $1/32$  inch lower than the segment and square (not grooved so the edges are as high as the segments), and this cutting can be made with a hack saw blade or a knife file, and the channels between the segments made very slightly wider than the mica. The restoration of a commutator is usually work that only an expert should undertake.

#### Grounded Armature.

A grounded armature or commutator may be indicated by heating or sparking. The test for grounding should be made before that for short circuits or open circuits, because two grounds might cause what would seemingly indicate a short circuit. Insulate the brushes from the commutator with strips of heavy paper. Then touch one lead of a circuit tester to the commutator surface and the other to the armature shaft or other metal of the motor. If the lamp is not lighted, or if the meter used does not indicate a flow of current, there is no ground. If the lamp lights or the meter shows flow of current, examination may show the ground.

An open or short circuit in the armature may be tested by leaving the brushes contacting with the commutator and disconnecting all outside leads but one, and preferably from all brushes. All brushes must be insulated from everything but the commutator, but if one brush is permanently grounded the test may be made by connecting one dry cell between the brushes with an ammeter in the circuit and in series between with the dry cell. This connection will give a flow of about 10 amperes in most cases. Turn the armature slowly by hand and read the ammeter, for if there is a noticeable variance in the reading at any one point this indicates either an open-circuited or short-circuited coil. The condition of the commutator surface and the brush contact must both be good for this test.

To test the field coils, at least one end should be isolated, and preferably both ends. If neither can be isolated the outside connections may make most of the tests useless. Isolation can usually be accomplished by disconnecting the battery by placing paper between the brushes and the commutator and removing all wires and other connections from the motor and brush terminals. If the motor is a third-brush type the brush may be lifted and used for testing, as it forms one end of the field winding. By using either a high or low-voltage test lamp, or an ammeter or a voltmeter, with one contact touching a clean point on the metal of the motor and the other touching one end of the field, grounds will be indicated. If the lamp lights or the meter shows current flow, the defect is a ground. Should one end of the field be grounded the resistance of the coil must be known or calculated, or comparison made with a coil known to be in good

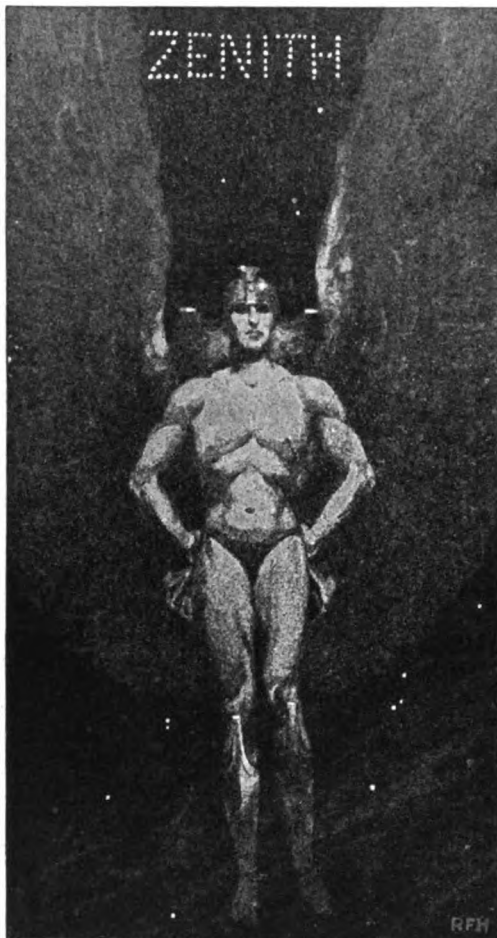


condition. If there are several coils, each can be tested, and if there is great variance shown by one it is probably defective. With an accurate ammeter and one dry cell connected in series with the field and the ground of the motor frame, the amperage flowing through the good coil can be determined. If, when testing the field, the amperage is much greater than this flow, the field is grounded at some point between the permanent ground and the point touched with the test contact.

#### Field Short Circuits.

Field short circuits may be between different turns in one field coil or between the windings of one coil, or between two different coils. With the fields isolated from all other connections they may be tested with a high or low voltage test lamp or with an ammeter or voltmeter as for short circuits.

The wiring diagram of the motor is necessary to learn how the field windings are connected and what windings are connected with each other. When one learns that certain windings should be insulated the tests may be made. When using the test lamp, voltmeter or ammeter, the test points should be connected with two points (coils) that should be insulated from each other, the connection being generally made at the terminals or the brushes. If the lamp lights or the meter shows a flow of current or voltage the coils are short circuited on each other. If the lamp is not lighted or there is no current flow the coils are well insulated. One test contact should be on one field coil terminal and the other placed on



**WHAT** automotive authorities think of the Zenith carburetor is indicated by the fact that Zenith is standard equipment on the majority of European automobiles, and on more than one hundred American makes of motor cars and trucks.

**Zenith Carburetor Co.**

New York  
Lyons

DETROIT  
London

Chicago  
Turin

(When Writing to Advertisers, Please Mention the Automobile Journal.)

each end of any other field coil terminal, so that each coil is tested for short circuits on each other coil.

To test for high resistance the low voltage test lamp may be connected to the two ends of the field, as for finding open circuits, and if the lamp is dim there is high resistance at some point. The voltmeter leads may be connected to the two ends of the field coil while current from a battery is allowed to flow through the field, and if a low reading is shown the resistance is not excessive, but if the voltage is nearly as high as the battery there is high resistance or an open circuit in the field line.

If the motor has been disassembled possibly some of the connections are not correct, the field windings reversed or some windings oppose others. When motors have two, four or six poles, each alternate pole or coil should have the same polarity—that is, the positive and negative poles should alternate around the motor regardless of the polarities that may be thus brought on opposite sides of the armature. One test is simply connecting the motor generator directly to a battery, or by closing the cut-out with the battery connected. The generator will then run as a motor in the same direction as when driven by the engine. Reversed fields may be detected by a pocket compass placed close to the pole pieces or to points on the motor housing in line with one of the field cores. The compass should be removed and next placed similarly near the field next to the one first tested. The second field should be of opposite polarity to the one first tested. If the compass is not taken away from the motor between tests the polarity of its needle may be reversed and the test made valueless. Fields that are normally opposite each other while generating, as in reversed series types, may be tested with the compass by sending a small current from a dry cell or cell of a storage battery to flow in the windings, and then opening or short circuiting one of the windings while the other is tested. The two windings should be of the same polarity, rather than opposite, when so tested. The reason is that current from the generator to battery flows in opposite directions through two windings, while from the battery to the generator the current flows in the same direction.

The accompanying sketch is the wiring diagram of the Delco system installed in Buick 1915 cars designated as C36, C37, C54 and C55.

#### DEMAGNETIZATION OF PERMANENT MAGNETS.

(H. M. W., Chickasaw, Pa.)

1—At what rate will the permanent magnets of a high-tension magneto become demagnetized if they are left without a keeper. I have been told that they would be ruined in a night. I cannot believe this, because I have tested a set of magnets by lifting a weight and laid it away for seven weeks without a keeper, and by making the weight test found they would lift as much as when first tried.

2—What proportions of acid and water must I use to make a quart of electrolyte for a storage battery that will have a specific gravity of 1.300.

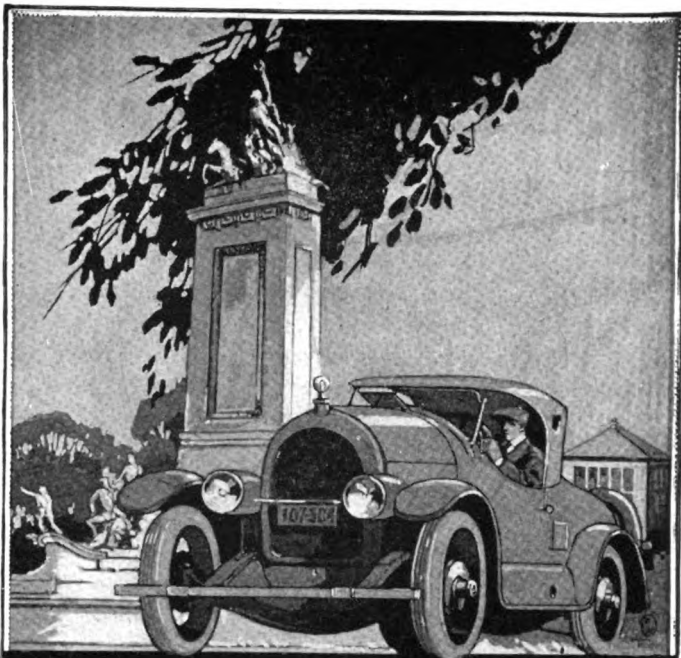
3—Because of the angularity variance of the connecting rod of a steam engine more degrees of rotation of the shaft are accomplished while the piston is in the crank end half of the cylinder. Will this law hold good in automobile engines. If so, what half of the cylinder will the piston be in when the shaft rotates the greatest number of degrees, and how many more degrees will it rotate on that end; engine bore  $3\frac{1}{4}$  inches and stroke five inches.

The rate of demagnetization of magnets depends entirely upon the influences surrounding them. The purpose of using a keeper with a magnet not used is to maintain the complete circulation of magnetism by placing the keeper across from one pole to another. This applies to any form of magnet with which a keeper can be used. Any unmagnetized metal that is a conductor, such as iron or steel, which will absorb and retain magnetism, will, if placed near a magnet, gradually absorb some magnetic force. Ship's compasses are protected against what is known as local influence (the attraction of iron, steel or semi-steel) by installing in direct line with the keel and at approximately the same level as the

compass, bars of soft iron, at either side (forward of and abaft of) the compass itself. These bars of soft iron are expected to exercise the strongest influence on the compass and prevent it being attracted or influenced by less potent forces. These bars become magnetized to some extent and demagnetization is accomplished by heating them white and then cooling them slowly in pits or troughs filled with powdered charcoal. After demagnetization they are replaced in the vessel and used until the condition of the compass indicates that they have again become sufficiently saturated to repetition of the treatment. Heat will demagnetize iron or steel. Soft iron or steel will absorb magnetism quickly, but the greater part of this will disappear when subjected to the influence of similar metals placed near. Tempered steel will, however, retain its magnetism much longer, and generally speaking the harder the metal the longer will it retain magnetism. Magnets are usually charged by subjecting them to the movement of an electric current, and the process of charging is ordinarily brief, and demagnetization may be equally rapid if exposed to the movement of a current through the magnet. The average magneto can be used for years and the potency of the magnets will not be seriously impaired.

The mixture of sulphuric acid and water becomes a compound and it is not a simple physical mixture. When so combined the volume of the mixture will be less than the sum of the volumes of the acid and water composing it. For this reason one cannot well calculate the specific gravity of electrolyte of given volumes of acid and water. To make electrolyte of 1300 specific gravity, which will show a percentage of acid of 28, 39 parts of 1.835 acid must be mixed with 100 parts of water, these measurements to be by volume. Measured by weight the percentage of acid would be 42 and 72.5 parts of acid is required for each 100 parts of distilled water. Both acid and water can be more easily measured by volume, although the acid is usually sold by weight. To make a quart of electrolyte of the density specified an approximate mixture can be obtained by mixing nine ounces of acid and 22¼ ounces of distilled water. This will have a slight excess of acid, but this can be reduced by adding water after testing with a hydrometer. One caution should be specified—pour the acid very slowly into the water. Mix the electrolyte in a glass or earthen vessel and stir with a glass rod. The mixture will heat and later cool. The specific gravity test should be made after cooling. Sulphuric acid may be obtained in two qualities—chemically pure, which has specific gravity of 1.842, and commercially pure, which has specific gravity of 1.835. The commercially pure acid is what is usually dealt in by chemical supply concerns and this grade is referred in the proportions specified above. Battery service stations usually purchase electrolyte of 1.400 specific gravity, which is obtained from manufacturers of acid and batteries, and this can be reduced to any desired density by the addition of distilled water. This is the most convenient and economical manner of handling electrolyte.

Determination of crank angularity is made for the steam engine because of the fact that with all of the slide valve type power developed is dependent upon the opening and closing of the valves, which is based upon position of the piston, which is found by locating the crank angle. The factors governing slide valve operation are travel, throw of the eccentric, outside or steam lap, inside or exhaust lap, lead of the valve, lead angle, lap angle, angular advance and linear advance. As these factors need not be considered in internal engine practise so far as valve action is concerned, centrifugal and inertia forces and their relation to piston velocity are determined by engineers. Assuming a revolution of the crankshaft in terms of degrees and considering its movement. From top center with the explosion stroke maximum velocity is reached at a crank angle between 70 and 80 degrees. The exact value depends upon the length of the connecting rod. If the rod were infinite length the maximum speed would be reached at 90 degrees. The piston decelerates. Instead of having energy to move it as at the beginning of the stroke, it has momentum that exerts force upon the crank pin until the end of the stroke. At the outer or bottom center at 180 degrees of crank angle the piston stops and energy must be



## Avoid Power Waste

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Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

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## GREB RIM TOOL



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

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Provide yourself with the best rim tool on the market and save time, trouble and rims.

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exerted to move it, and it will reach its maximum speed on the return between 100 and 110 degrees from the bottom center. With a known length of connecting rod crank angularity can be determined. These have value in determining the inertia forces of the reciprocating parts of the engine, the gas pressure and the resultant forces on the piston during the four piston strokes, which, with the centrifugal force, make possible determination of the bearing pressure on the wristpin, crankpin and crankshaft. Crank angles and piston positions establish piston travel in the cylinder when the ratio of connecting rod to crank length is known.

### GEARING CAR TO 100 MILES AN HOUR.

(G. D., Woonsocket, R. I.)

One of my customers owns a 1914 Alco car and would like to gear it to 100 miles an hour. Will you give me some information about increasing the gear ratios and the address of some reliable firm that would make the gear?

Precise information cannot be given without exact knowledge of mechanical conditions. There is no assurance that 100 miles an hour would be possible with the car. The only practical change would be in the ratios of the driving pinion and the master gear bolted to the differential gearset case.

Much depends upon the engine capacity. Designers usually allow 100 pounds of car weight for touring cars, 50 pounds for high speed roadsters or fast roadsters and 50 pounds for racing cars. If the engine has sufficient power and the chassis can be reduced in weight the change in gear ratios may be justified.

The change may be made by substituting a smaller driving pinion, or a smaller master gear, or both may be smaller. The size of the driving wheels is also a considerable factor. A fair guess is that the present gear reduction is approximately four to one, the engine turning four revolutions to each revolution of the wheels. If the maximum speed now obtained is 60 miles an hour the reduction to  $2\frac{1}{2}$  to one would in theory afford the speed desired, provided that the engine had sufficient power, for the road and wind resistance would be very largely increased. For instance, the atmospheric resistance at 100 miles an hour would be approximately 40 pounds the square foot as against 14.4 at 60 miles.

The Boston Gear Works, Norfolk, Downs, Mass.; Brown & Sharpe Manufacturing Co., Providence, R. I.; Brown-Lipe-Chapin Co., Syracuse, N. Y.; Crofoot Gear Works, 21 Ames Street, Cambridge, 38, Boston, Mass.; Hartford Machine Screw Co., Hartford, Conn.; Meisel Press & Machine Works, 350 Dorchester Avenue, Boston, Mass.; Puritan Machine Co., Detroit, Mich.; Zelfgang Machine Co., Niagara Falls, N. Y., are a few of the convenient manufacturers of gears that could supply your order.

### LUBRICATING OAKLAND CLUTCH SHIFT ROD BEARING.

(G. I. DeV., Chicago, Ill.)

How do you lubricate, or what provision is made to lubricate the clutch shift rod roller bearing of the 1916 Oakland? If I ride the clutch a quarter mile it burns dry.

The roller bearing for the clutch shift rod of the 1916 Oakland car is submerged in heavy oil when it is fitted, which thoroughly lubricates it for the time being. There is a channel in the rod (a drilled duct) that is intended to carry oil from the transmission gearset case to the bearing, and should this be obstructed no oil will flow through it.

The cause of the bearing burning dry is undoubtedly due to the oil duct being filled, and examination will probably disclose this condition.

### MAGNETIZED SCREW DRIVER.

(K. T., Brockton, Mass.)

Would it be possible or practical to magnetize an ordinary steel screw driver by holding it near a dynamo.

A steel screw driver may be magnetized by holding it to an electric dynamo for a short time. The magnetized tool will be found a great convenience in picking up screws, nuts, bolts or small metal objects that have fallen into inaccessible places; also in holding screws, especially small ones, in position until they are set, as this may be done with one hand.

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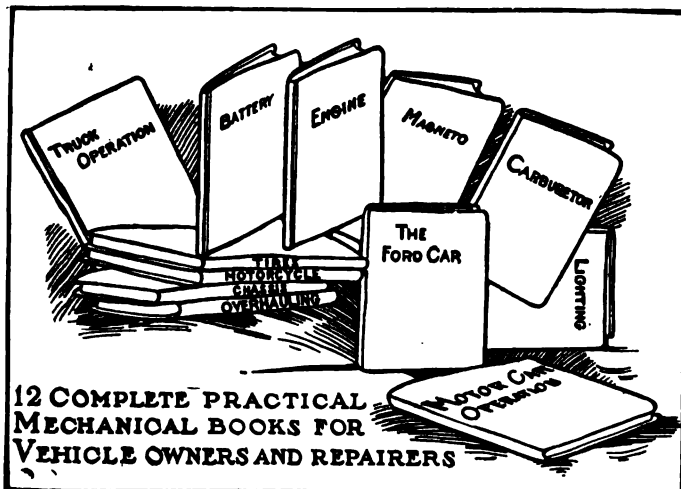
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REGISTERED  
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OPERATING COST,  
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**INSURES**

**CAR EFFICIENCY,  
CAR SERVICE LIFE,  
FULL CAR SATISFACTION**

EAGLEINE Quality has been proven by years of experience of motorists who know.

EAGLEINE Oils are made in grades for all engines.

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Easy to install between manifold and carburetor flange.  
No obstruction in gas passage of manifold.  
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Sold postpaid ready to install.....\$7.50  
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Complete Stock of  
**GENUINE PARTS.**

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50% to 90% Off List.

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If you want any part not listed here,  
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## AUTO SAVE 50-90% FOR 400 CARS      PARTS

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Motors,      \$25.00 up	Presto Tanks, \$4.50 up
Magnetos,    4.00 up	New Spotlights, 2.00 up
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SOFT, CLEAN, WHITE COTTON  
WASTE.

Assorted wiping rags—New, clean sanitary. Sample on request.

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Install a set of:

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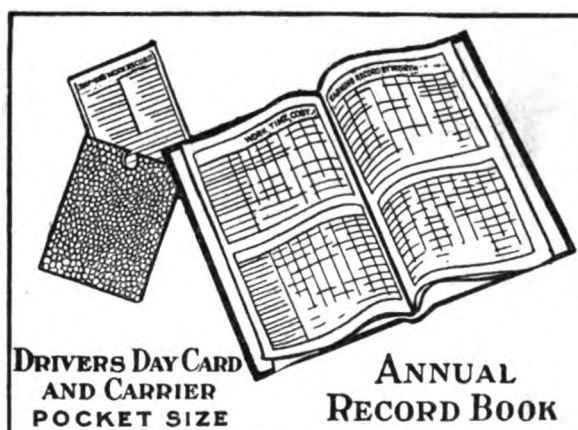
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The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

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The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

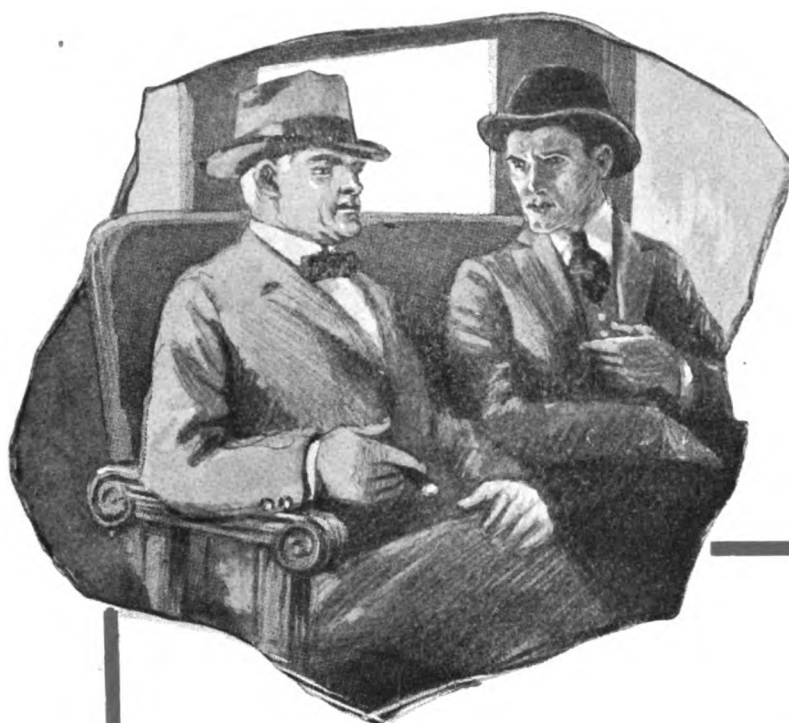
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**Rhode Island.**



# Why Holman Wanted Another Job

"Tom," said Holman, "I'd like to travel the Norwesco line. Think they'd take me on?"

"Why, maybe—but what's

wrong with the line you've got?"

"Well, it's this way—if I'm going to sell a radiator repairer, I want one that the dealers are glad to stock. I've found all my customers like SE-MENT-OL. It's put up in a standard, one-size can—there's no need to load up the shelves with several different size cans. The dealer sees where he makes more money on a smaller stock when he handles SE-MENT-OL. I'd rather sell Norwesco than buck it."

## SE-MENT-OL ( LIQUID AND POWDER )



One can of SE-MENT-OL is enough for the largest cooling system. **Guaranteed** to repair cooling system leaks **permanently**.

SE-MENT-OL Liquid, kept in the radiator, will keep the cooling system leak-proof for the life of the car. It is the **original** self acting radiator repairer.

Get rid of the slow selling brands that come in several sizes. Push SE-MENT-OL, in the popular one-size can.

**Retail Price, Liquid or Powder, 75 cents**

*Write today for dealer's proposition and discounts.*

**The Northwestern Chemical Company**

731 State Street,

Marietta, Ohio.

CANADIAN FACTORY: MONTREAL

*Other NORWESCO Products Include:*

Leather Top and Upholstery Dressing  
Skalex, the radiator cleaner  
Carbonox, the carbon remover  
Valve Grinding Compound  
Never-Burn, engine enamel

Utility Black, retouching enamel  
Mohair Dressing and Lining Dye  
Neatsfoot Clutch and Brake Compound  
Color Varnishes—Shellac  
Iron Cement

(When Writing to Advertisers, Please Mention the Automobile Journal.)

## New Home of Representative New England Distributor

*Noyes-Buick's Boston Headquarters Are  
Unsurpassed by Any Similar Structure in  
the East Devoted to Sale of Motor Vehicles*

(By S. G. SWIFT)

WORK tinctured by faith is still the fundamental law of success, and achievement the remuneration for applied ambition. Today, as in countless days gone by, the busy world is ever ready to pause in its stride to pay homage to the institution which points new paths of progress, and the beautiful new home of the Noyes-Buick Co., 857 Commonwealth avenue, Boston, which overlooks the historic Charles river, emphatically proves the truth of the foregoing.

This modern building, which so logically combines the artistic and the practical, contains five floors, with a total area of five acres, every inch of which is devoted exclusively to the wholesale distribution of Buick automobiles and GMC trucks. In beauty of design and workmanship it raises the standard of automobile homes and strikes an original note which is bound to have great and far-reaching influence in the construction of buildings erected in the future for similar purposes.

At first glance the casual observer is most impressed by the wonderful beauty and grandeur of the edifice, but a careful study of the physical features shows

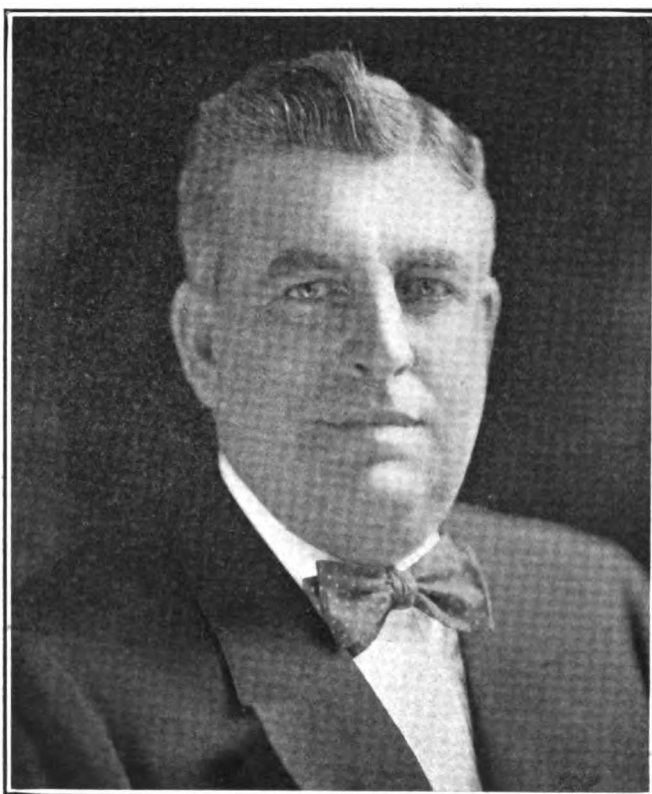
that it is really a structure of rugged simplicity, while the ornamental finish has a dignity far removed from cheap and tawdry display.

In general appearance the exterior is

unsurpassed by any commercial building in the city.

The rough construction is of reinforced concrete, faced with Indiana oolitic limestone, laid slab style, which gives the appearance of solid blocks. On the Commonwealth avenue side of the building there are two immense ornamental mar- quises which overhang the two vestibules of the twin show rooms, and on the east, looking toward Cottage Farm bridge, another of even larger proportions juts out over the entrance on that side of the building. The impressiveness of the large columns at the front of the structure, beautifully designed, is further enhanced by 21 wrought iron lanterns, pendant from the tops.

The entire front and sides of the ground floor are lighted with bays of heavy polished plate glass, with Kawners copper mullions, and colored leaded glass camber head transoms, in the blue and white panels of which the trade names, "Buick" and "GMC" appear. All of the window trim and frame is of cast iron, and the limestone arches above the leaded glass transoms are ornamented with rosettes carved in the



Harry K. Noyes, President and Treasurer of Noyes-Buick Co.

gothic style, the same design predominating in the belt course. The parapet, in which two large Buick panels and a GMC panel are set, is decorated with terra cotta panels of blue and white, producing a pleasing effect.

The doors to the entrance of the show room vestibules, and the main lobby, are of heavy quartered oak with massive bronze trimmings, and were especially designed and made by hand.

The entire aspect gives the idea of harmony, so far as the exterior is concerned and as one passes through the ample doorway, he realizes that the same simplicity of harmonious design has been carried to the interior as well.

**Interior Finish Has Touch of Old World.**

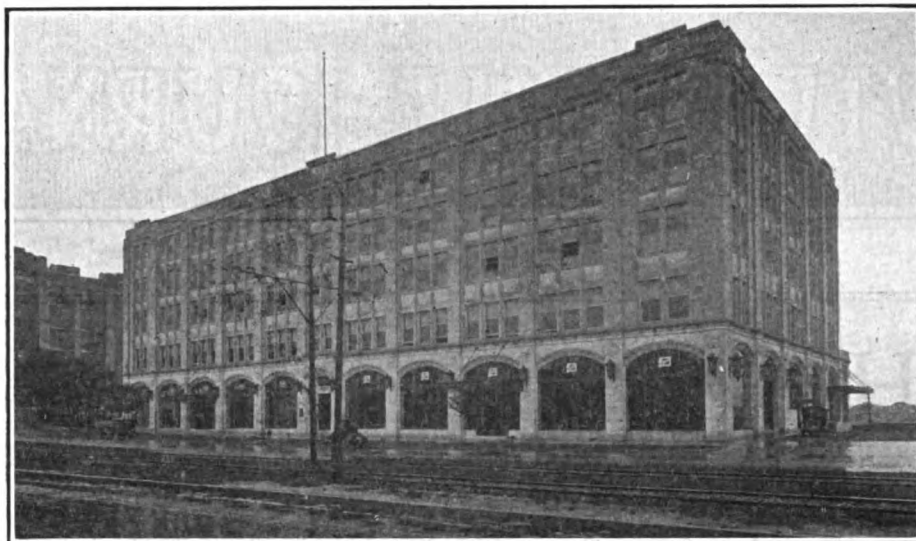
The twin show rooms in the front of the building have 4500 square feet of floor space, which affords ample area for the display of trucks and automobiles. These rooms have a gray sanded tile floor, with a Holland brown border, and

the windows have stools of gray Tennessee marble.

The walls are cast travertine, and laid up as ashlar, to match the limestone on the outside, the travertine running up to an old Roman ceiling on walls and pilasters. This travertine is believed to be mixed in exact proportion to that found in old world ruins and, while it would require one versed in the language of art to adequately describe it, it seems safe to employ a time-worn platitude, and say that it is especially beautiful in coloring and texture. It has the look of

designed furnishings.

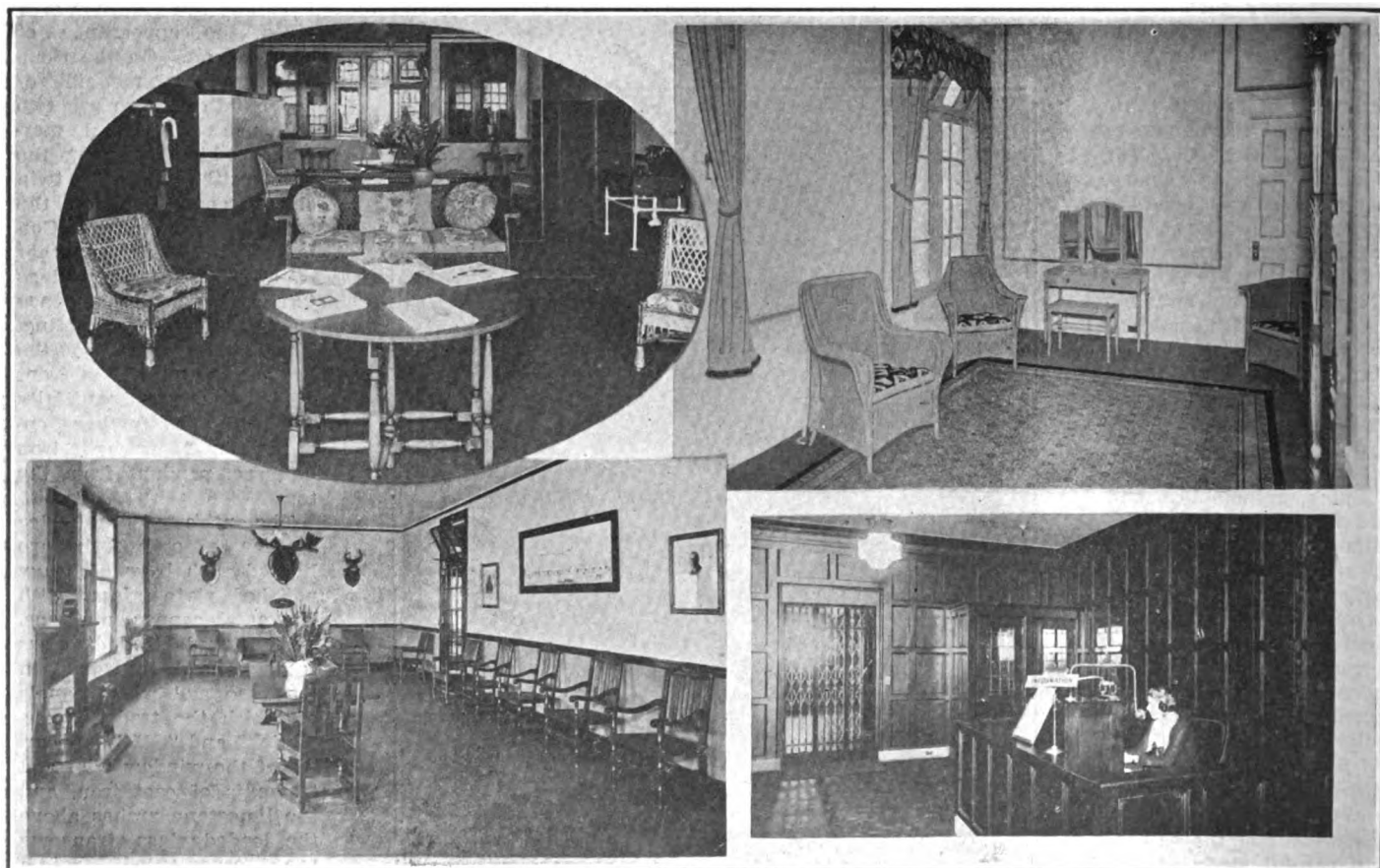
In the center of the Buick show room, which is on the right as one enters, there is a grand stair case, 11 feet wide, which runs to the lobby on the second floor. In design and workmanship—both inadequate words when used in this connection—this stair case has been considered by competent art critics to be the most artistic in Boston, with the possible exception of one in the public library, and appears to have been transplanted bodily from some palatial mansion in the old world.



**This New Building Supplies New England with Buick Cars and GMC Trucks. It is a Striking Example of Modern Architecture and is Strictly Fireproof.**

weathered fire brick, and this effect is furthered by artificial mars or blemishes, which appear to the eye to be the result of erosion and time.

A large fire place with a heap of white barked birch, contentedly awaiting the wintry days, also adds color to the sales rooms, and strikes a happy note in the general harmony of beautiful lines and tastefully



**Upper Left—Women's Rest Room. Upper Right—Customers' Waiting Room. Lower Left—Dealers' Assembly Room. Lower Right—"Information."**



Of the finest gray Tennessee marble, with stone balustrade to match, it has a ruggedness and simplicity of outline which ranks with the best traditions of the Bay state, and art lovers of Boston have given it the seal of their approval, which means that it is right.

#### Executive Offices on Second Floor.

The 17 executive offices, accounting department, dealer's room and rest rooms, with space for another truck show room, are all on the second floor, which is constructed throughout with a hung ceiling. The offices line the front of the building and open on to the main hallway, the dividing partitions being finished in yellow tint, with large leaded glass doors. The wood trim on this floor is made up of plain oak, quartered oak, sycamore and chestnut, which is laid up with a simplicity of outline that approaches the severe.

service station employees, the latter room being reached from the service station by a stair case constructed for that purpose. There is as yet no lunch room service and, as practically all of the 180 workers are enthusiastic boosters for the "carry-your-lunch" movement, the rest rooms present an animated scene during the noon hour.

#### Women's Rest Room Model of Comfort.

With all respect to other organizations, and other rest rooms, it is doubtful if any in New England can compare with the women's rest room in appointment. Tastefully furnished in wicker furniture with tapestry upholstery, it is the embodiment of comfort, and the wicker couches and reclining chairs invite the observer, almost against his will, to stop and rest awhile.

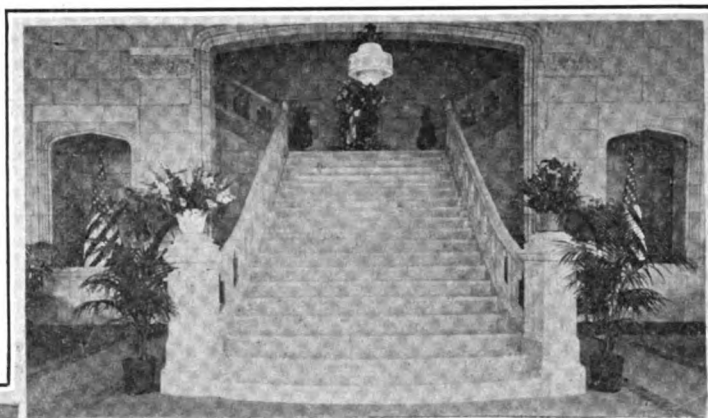
Growing things lend an air of out-doors to the quiet room, and the current

he is in the assembly room of a big factory. The large amount of parts carried invoices at one-half million dollars, and contains, in large quantities, practically everything needed to assemble a new Buick or GMC truck, with the possible exception of the body.

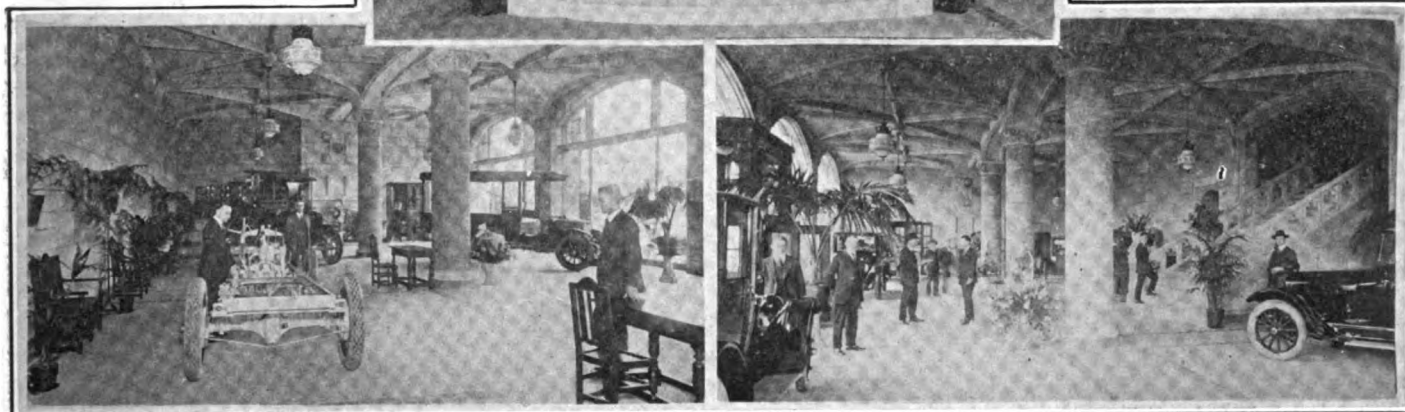
Piles of engine blocks, flanked by heaps of rear and front axles, lie close to barrels of hub caps, and some idea of the immense amount of stock can be gained from the fact that even in these days of efficient self-starters, the writer counted seven barrels of hand cranks. It doesn't seem possible that use could ever be found for so many of them, but there they are, and it is obvious that they aren't kept for show.

More than 15,000 cards were necessary to list this vast amount of materials, and 20 clerks under the direction of the advertising manager, comprise the person-

Above—This Artistically Designed Staircase Is Made of Gray Tennessee Marble with Stone Balustrade to Match. It Has Occasioned Much Favorable Comment.



Below—Twin Show Rooms, Situated to Left and Right of the Main Entrance, Are Glass Enclosed on Three Sides and Have a Combined Floor Area of 4500 Feet.



With some few exceptions the furniture in the halls and corridors is of antique design and was planned by Irving & Casson, the decorator, who also attended to other details of interior finish. Filing cabinets, desks, telephone booths and all furniture and furnishings are of some shade or tint of brown, and the wall paneling, of walnut, also follows the general color scheme.

The telephone booth and information desk, located at the head of the stairs, is paneled waist high with walnut, and the busy operator is provided with an easy chair although, truth to tell, she has very little time to use the back of it.

#### Men Have Two Rest Rooms.

The men's rest rooms, two in number, are well furnished, and are at all times supplied with the latest fiction and technical magazines. One of these is for general office men, and the other for

books and magazines, dear to the heart of woman, are provided for those who would combine reading with rest. Ample drinking water, cool and refreshing, bubbles from an automatic fountain, and the retiring rooms and lavatory are examples of the architect's best mood. And if anyone wishes to know whether the young women appreciate this consideration for their comfort, he has but to look in at the open door during the noon hour.

As one practical minded dealer from Maine remarked, when being shown through the building, "The rest rooms you people have for employees is the best argument for the open shop I know of," and without discussing the ethics of the remark, one is inclined to agree with him in abstract.

The stock room, located in the rear of the first floor, makes one think that

nel of this department. All small parts, such as springs, valves, nuts, bolts and washers, are dispensed from Durant steel cabinets. These are all arranged by "families," following the system adopted by the General Motors Co., and almost identical with the method of listing books used in the Congressional library at Washington. A new clerk, who had never been inside the department, would be able to start working immediately and, by following simple directions, would be able to locate any article asked for.

For instance, suppose he were looking for a valve spring collar key: He would glance down the aisle until he located the letter "V," the wing cards giving him the location alphabetically. Going to the cabinet so marked he would find "Valve Family" on another wing card, in the corridor, to the right of the aisle. Under

"Valve Family" he would find what he wished for listed alphabetically on another wing card, and the writer can testify to the ease with which he would be able to get what he was after. The illustration will serve to explain the working of the system, which is ideal and efficient. **"Parts" Salesman Keeps Dealers' Stock Complete.**

In addition to the large stock carried by the home office, the 108 dealers are also supplied with a working stock of parts, apportioned to the size of their agency. There is no guess work as to whether a dealer is properly stocked either. A very efficient salesman attends to this phase of the matter and spends his entire time in calling on the agents. He doesn't say a word about cars, neither does he claim to know anything about them. He is an expert on parts, and parts alone, and knows exactly what stock each dealer in his territory has on

Endeavor is primarily made to supply the missing part. If neither the home office, nor any other dealer has it in stock in the New England territory, and this can happen with older models, the department tries to get it from other districts. Recently the department got a much wanted part for an old model from San Antonio, Tex., after having been advised of its whereabouts by the dealer at Dallas. All of these emergency inquiries are made by telegraph, frequently at much expense, but the company believes that "Service is service, only as it serves," and goes the limit to adjust matters.

Having supplied the necessary part required by the disgruntled customer, a letter is written telling him why the local dealer was unable to give the service asked. Particular emphasis is given to the fact that the dealer was not at fault, and explanation is made in a log-

competent workman with a corps of helpers, attends to all frame alignment work, and makes a few small parts that are necessary from time to time. The writer was much interested in watching this department straighten out a truck frame that had been bent in nine places, and is prepared to state, from previous knowledge of the trade, that the work was done faultlessly, being exactly true when tried with straight edge and square. The machine shop, also a part of the service station, contains little equipment, as all parts come from the factory milled and ground, and little if any machine work is necessary.

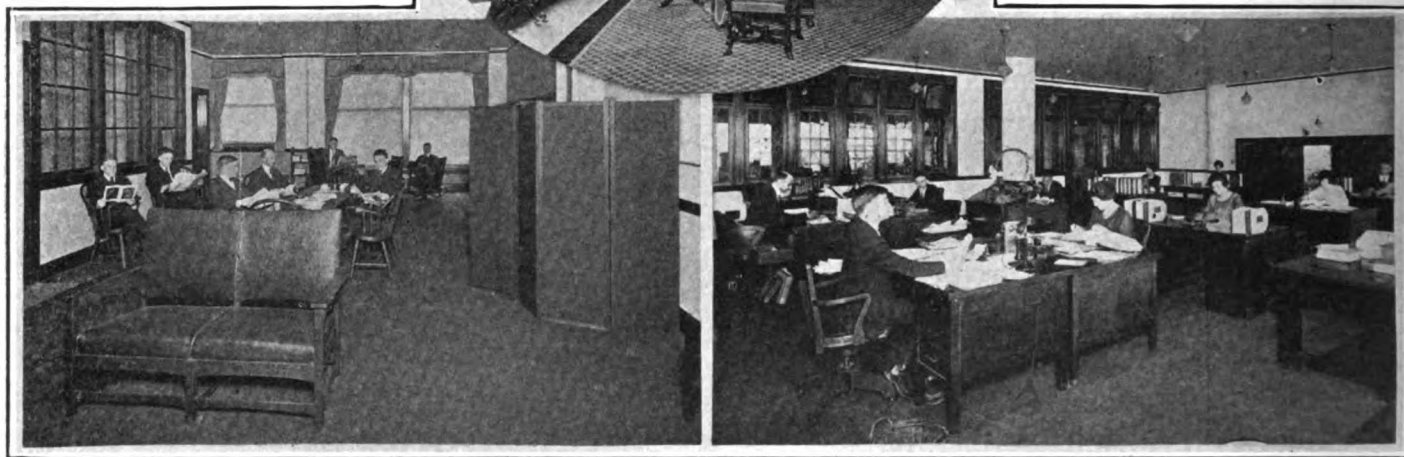
#### Three Acres of New Buicks.

All cars and trucks, after having been received and tested in the service station, are taken by the twin A. B. C. elevators, which carry four automobiles or two trucks, to the third, fourth and fifth floor for storage. These three floors at

Above—View of the Private Office of President Harry K. Noyes, Founder and Owner of the Noyes-Buick Co.



Below—Left, Clerks' Rest Room During the Lunch Period. Right, a Busy Corner of the Accounting Department.



hand at any given moment. He inventories their supplies, suggests ideas for better service and many busy agents have given him the entire charge of their stocks, all of which accounts for the fact that Buick dealers are always well supplied with parts.

No one realizes better than he the importance of at all times carrying as complete a stock as possible and, though the supplies carried by the different agencies total \$300,000, it frequently happens that some part is missing, and the company is occasionally in receipt of letters from customers who claim to be unable to get proper service.

#### Trouble Department Backs Up Dealers.

When this happens the trouble department gets busy. This department is also under the personal direction of the advertising manager, who investigates all complaints personally, first referring them to the president.

ical manner which does much to promote good feeling between owner and agent.

#### Service Station for Buicks and GMC's Only.

The service station employs 50 men. Practically all of this crew are skilled mechanics who have specialized on Buick and GMC service. They test the cars when they arrive from the factory, and tune them up to the highest degree of efficient operation. No repairs on customers' cars are made unless authorized by an agent, who sends them to the station and only Buick automobiles and GMC trucks are serviced. The charge for work not cared for under the guarantee clause in the contract is \$1.25 an hour, which, considering the labor saving methods employed and the consequent saving of time, appears to be very reasonable.

A blacksmith's shop, in charge of a

present are filled with new cars, and one can get an idea of the number by thinking of a three-acre field parked with orderly rows of automobiles. The visitor hardly believes that so many cars can ever be sold in New England, but Buick is a staple—a necessity of life, so to speak, and the entire allotment for 1921 has already been marketed. Not only that, but the company is trying to get its allotment increased. Despite rumors of bad business in other lines, this concern looks forward to a year of the biggest truck and automobile business it has ever done and, if coming events still "cast their shadow," the view has substantial foundation.

All cars, at the present time, are received in Charlestown, as the company has been unsuccessful in getting a spur track from the railroad, but it is expected that this condition will soon be remedied and deliveries will be made by

freight, direct to the plant, which is within a few feet of the railroad track. Garage and Heating Plant in Basement.

The entire basement is used as a storage garage, with the exception of a room for the heating unit, which is a Fess oil burner of the vapor type. Small and easily handled, this little machine heats 35,000 square feet with little effort, and appears to be very efficient. The radiation is all of the concealed, or indirect form, with the exception of certain work rooms, and much clever planning is apparent in the way in which the heat is distributed to the show rooms and offices.

The building has a wet sprinkler system with approximately 2450 outlets, and the piping is concealed. This was installed by the General Fire Extinguisher Co., Providence, R. I.

architect and the whole work of construction and finishing has been done under the personal supervision of Harry K. Noyes, president of the Noyes-Buick Co., the man who made the undertaking possible. Mr. Noyes is modest and retiring to a marked degree and has a wholesome dislike for ostentation in any form but, under the circumstances, it seems proper to print a very short paragraph of the man and his achievements.

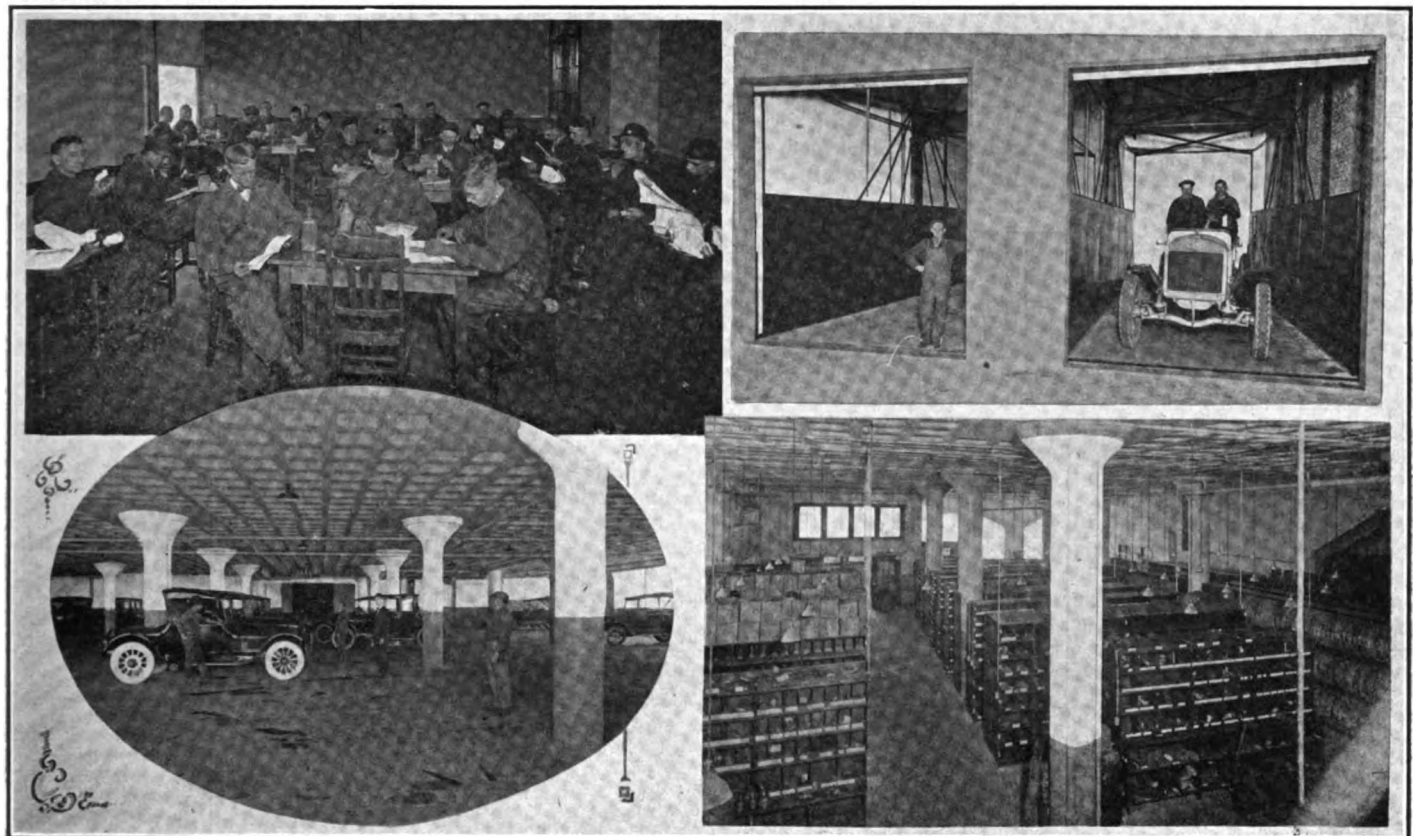
He first started in the automobile business in Lowell, as a Buick dealer, and later became New England manager for the Buick Co., located at Boston. His unusual success in business is largely accounted for by his limitless faith which, coupled with his capacity to thrive on hard work, has made him an outstanding figure in the business world of Boston.

The entire personnel of the Noyes-

though said to be a distinct innovation in the conducting of a large business, have proved their value.

All welfare work is in charge of the advertising manager. This part of the organization is too young for much to have been done, but many plans for winter entertainment are being made and a bowling league is being formed. It is possible, too, that community buying of household supplies may come when prices get a bit more stabilized, and the employees feel that this part of the work will be well taken care of if detailed to the same person who picked out the half ton of turkeys which the company gave to the employees at Thanksgiving. **Entire Organization Formed to Aid Dealer.**

The motive underlying the construction and intended use of the beautiful



Above—Mechanics' Rest Room and Twin A. B. C. Elevators. Below—Car Delivery Department and Part of the Stock Room.

The type of construction used throughout the building, which was erected by the Fred T. Ley Co., Inc., Springfield, Mass., is known as "Grid," and the Noyes-Buick building is the largest that has been built in this manner, the main feature of which is the absence of pillars, and the added floor space, all suspension being made by a series of wires which run from the plates of the building at the floor heights to central columns. Roughly speaking, it embodies the principle of the suspension bridge, which permits the carrying of great weight.

The electric lighting system, with the exception of several large, hand-wrought lanterns, is of the indirect lighting type, with concealed wiring, and was installed by Bigelow-Kennard & Co.

Arthur H. Bowditch & Co. was the

Buick Co. is efficient to a high degree. Everything is done by team work, and there is no set organization. Each department is a unit of the "family" group. The head of the company, Mr. Noyes, has surrounded himself with cheerful, capable workers, and the worst grouch in the world would absorb the idea of good fellowship after working at the plant a few days. It fairly radiates, and the results of the "family" idea have been wonderfully successful.

Team work is the rule and not the exception. Everyone is called by his first name and titles don't go. There aren't any office boys, and even the president distributes his own mail and carries his own messages. The entire workings of the different departments are along lines as simple and plain as the beautiful architectural design of the building, and

building is best described as "backing up the dealer." The management believes that the agent is in reality a salesman and, as such, is a component unit of the organization. It does not believe that he should be left to his own resources entirely, and has planned in many ways to give material aid, which shall result in closer cooperation.

With the return of normal conditions, with car production hovering around the saturation point, a new era has dawned in the automotive industry, and the company feels that the entire future of the business depends not only upon the quality of the product but, to a marked degree, upon the skill shown in marketing. With the boom attendant on war conditions and during the very early stages of the industry, the dealer needed no assistance in marketing his allot-

ment, which frequently was sold without effort, but the future presents a different aspect, and the successful dealer must learn again the lost art of selling.

#### Efficient Programme of Sales Helps.

It is with this idea, long ago conceived, that the company prepared an efficient programme of sales helps for backing up the dealer. The most important item in the list is probably the new Buick sales room, and its organization of experienced salesmen, who are prepared to handle the trade of all prospective customers from all parts of New England. These purchasers receive the same attention that would be accorded them in the sales rooms of their local dealers, with the added advantage of very attractive surroundings.

Highly trained salesmen wait on the trade and close the sale, if possible, the dealer in whose territory they reside getting the full credit of the sale, at no expense to his account. All that remains is for him to deliver the car, and it is surprising to see the number of sales made in this way.

The resident salesman does not make any transaction involving the handling of a used car but, should the customer desire to make such a trade, takes his name and address on a blank provided for the purpose, which, with other details, are forwarded to the agent with instructions for him to call on the prospect and notify the home office of the result of his canvass. This is followed up in two weeks by a card filing system, which lists the prospect and the dealer in alphabetical and chronological order, and the dealer gets little peace until he has forwarded a report on the prospect.

Sales are frequently made to persons who have come to the place on a sight-seeing tour, and had no intention of purchasing. While such visitors are not solicited directly for their patronage, the shrewd salesman rarely scores a miss on a prospect, and many agents have been

agreeably surprised at opening their mail to find an order from some one whom they had never thought of as a prospective buyer.

#### Special Retiring Room for Dealers.

A dealer can also bring a client to the sales room with the same feeling of confidence and proprietorship that he would assume in his own place of business. Convenient desks are provided for the transaction of business, and the agent is welcome at all times. To assure him of this feeling a very attractive dealers' room has been prepared on the second floor.

This room is large and well appointed, and is lighted by windows for one side of its entire length. It has a marble mantle and a practical fire place, and is furnished with carved antique furniture. Over the mantle is a picture of W. C. Durant, the founder of the General Motors Co., and, on the other side, flanking a large water color of the building, are pictures of H. H. Bassett, president, and E. T. Strong, sales manager of the Buick Co.

In this room the dealer may receive and entertain his customers and friends while in the city, and the organization stands ready and willing to furnish any assistance or attention desired.

#### Will Aid by Advertising Campaign.

For Buick dealers and prospective purchasers the company is issuing three forms of catalogues. There is a large booklet with a blue and gold cover, illustrated with a complete line of the 1921 product, and general descriptions are detailed in such manner as to be understood by the layman. Another small booklet, for those mechanically inclined, deals with the technical features of the car, and a folder, to be used as a file for the casual inquirer and catalogue collector, has also been prepared, which completes the list.

In addition to this there will appear from week to week large double-page ad-

vertisements, as well as smaller ones, in weekly and monthly publications. The form of advertisements to be supplied is of unique and attractive design, and the combined publicity, already planned, is especially forceful and commanding. The catch phrase, "Authorized Service," will be continually and strongly displayed, and the company plans to make every owner a satisfied customer, if service and advertising can be used to make this possible.

In addition to the forms of advertising planned, a system has been developed whereby each agent will have a weekly advertisement in his local paper, over his agency name. Mats and stereotypes will be sent direct to these papers and will appear simultaneously throughout the country, all at no expense or trouble to the dealer.

#### Management Well Known in Automotive Field.

The entire personnel of the Noyes-Buick Co. has been carefully selected from a long list of applicants, and the officers, especially, have been hand-picked, being men well known in the automotive field of New England, as a glance at the appended list will show. They are: President and treasurer, Harry K. Noyes; secretary and general manager, R. G. Clarke; district managers, W. S. Simonds, F. W. Nichols, H. E. Noyes (also assistant treasurer) and C. H. Richards (who is manager of the truck department); comptroller, C. D. Paige; advertising manager, F. W. Tucker, and assistant sales manager, H. J. Carlson.

With a wonderful new building, a competent management and an ideal product to market, the Noyes-Buick Co. should go far along the road to success. It has the right idea of cooperation and efficient service, and these factors alone will serve to make it one of the most highly developed selling organizations in the country.

#### 1920 PRODUCTION OF CARS IN DETROIT.

In reviewing the production of motor vehicles for the year 1920, a comparison of the output of the Detroit automobile factories, with the estimates made at the beginning of the year shows it to have been 25 per cent. less than the forecast, but the record is by no means to be depreciated when considered in the light of the various vicissitudes by which the industry has been affected during the past few months.

The figures are as follows:

Car	1920 Production	1920 Estimate
Briscoe	6,065	30,000
Buick	111,255	200,000
Cadillac	20,549	25,000
Chalmers	9,772	15,000
Chevrolet	126,172	120,000
Columbia	4,806	8,000
Dodge	141,256	200,000
Dort	23,853	30,000
Essex	26,002	40,000
Ford	1,023,552	1,000,000
Handley-Knight	115	.....
Hudson	21,357	30,000
Hupp	19,220	24,000

Jackson	1,347	6,500
King	2,081	10,500
Liberty	4,414	15,000
Lincoln	285	6,000
Lorraine	300	4,000
Nelson	615	4,000
Maxwell	34,168	80,000
Oakland	36,264	100,000
Oldsmobile	25,786	80,000
Overland	97,446	200,000
Packard	6,040	10,000
Paige	16,722	30,000
Patterson	1,071	3,000
Reo	14,839	22,000
Rover	1,657	4,000
Saxon	739	10,000
Scripps-Booth	9,288	20,000
Studebaker	45,200	80,000
Willis-Knight	15,513	80,000
Total	1,848,049	2,487,000

The figures given for Ford include both cars and trucks. Of the total, 153,532 were trucks and the balance passenger cars.

The record for Studebaker is for production in the Detroit plant alone.

It will be noted, from the above, that only one make, the Chevrolet, besides Ford, exceeded the estimated output.

The Ford company announces its in-

tention of increasing its output to 1,250,000 cars during 1921, while Paige has stated that its schedule will call for 20,000 cars.

#### CHICAGO NATIONAL SHOW IN COLISEUM.

The Chicago national automobile show will open Saturday, Jan. 29, in the Coliseum, and will continue through the following week. Many new features not embodied in the big eastern exhibition will be seen here, as some of the middle western and western manufacturers, both of motor vehicles and accessories, are accustomed to make the initial showing of their new products at Chicago, and nearly all of the cars previously shown at New York will also be on view here.

The exhibit is again held under the auspices of the National Automobile Chamber of Commerce and the management of S. A. Miles.

There will be no showing of commercial vehicles.



# New York Show Reflects Progress of Automotive Industry

## NEW YORK SHOW AT A GLANCE.

**Name**—21st Annual National Automobile Show.

**Date**—Jan. 8 to Jan. 15.

**Hours Open**—Jan. 8 at 2 p. m., and daily, thereafter, 10 a. m. to 10:30 p. m. from Monday, Jan. 10, to Saturday, Jan. 15.

**Auspices of**—National Automobile Chamber of Commerce.

**Location**—Grand Central Palace, 46th Street and Lexington Avenue; four lower floors.

**How to Get There**—Lexington Avenue Subway to 42nd Street; or Seventh Avenue Subway to Grand Central Station; or Third Avenue Elevated to 47th Street; or Surface Lines, 42nd Street Crosstown, Madison Avenue, Lexington Avenue, Third Avenue.

### Special Days—

Saturday, General Opening Day.  
Monday, All-America Day.

Tuesday, Automotive Engineers' Day.

Wednesday, Society Day.

Thursday, Army and Navy Day.

Friday, Dealers' Day.

Saturday, Suburban Day.

**Number of Makes of Cars Shown**—89.

**Number of Accessory Exhibits**—284.

of locomotion. And it is safe to say that not even the most ardent advocates of the future utility and ubiquity of the self-propelled vehicle could hardly have visualized the handsome creations upon which the eye may feast at this exhibition. There were no palatial limousines, stately sedans, rakish looking sport or touring models at the initial show, but only the, it might be said, experimental products of a few far-sighted manufacturers who were the pioneers in what has now become the third largest industry in the world.

The present exhibition, which occupies four floors of the Grand Central Palace, each floor a city block square, will consist of 89 exhibitors, each representing a different make of car, which will bring the total estimated number of passenger cars to be seen up to at least 350.

The New York show is again under the auspices of the National Automobile Chamber of Commerce, as is also its twin brother, the Chicago exposition, to be held later in the month, and again under the immediate general supervision of S. A. Miles. Mr. Miles recently returned from a trip West, in the course of which he saw many automobile men, and expresses himself as confident and even optimistic regarding the outlook.

It already appears that despite the depression evident at certain periods of the past year, the present season will show a wholesome recovery. The weak spots have been found and, where not entirely eradicated, have been strengthened. Predictions are freely made that

a large number of cars will be sold at the January show.

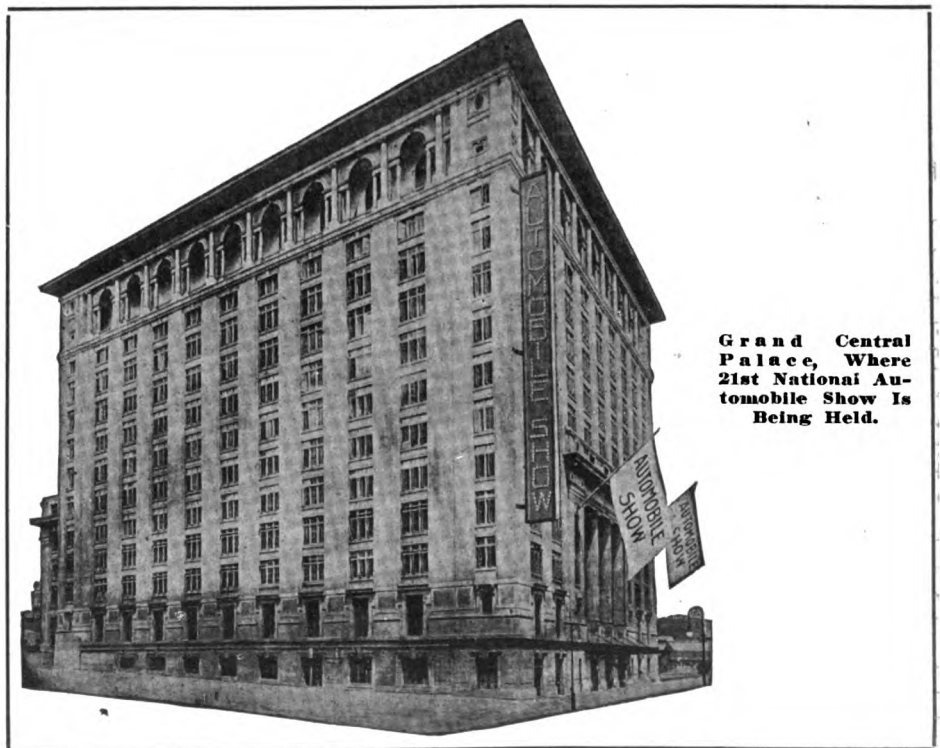
### A Practical Side to Exhibits.

While at these events manufacturers of and dealers in every make of car vie with one another to stage an exhibit of beauty, there also is a practical side to each display. The latest models of cars are, of course, shown and, while body design makes a car attractive, it is the engine that now makes the appeal to the majority of present day motor car prospects. Motor car manufacturers have, in the past few years, paid more attention to the power plant. There have been many improvements in body designs, but automobile builders learned many lessons during the period factories were turned over to the government for the purpose of manufacturing war material. Some of the most improved features in engines came as a result of these experiences, and such betterments will no doubt attract attention at the coming exposition.

These refinements tend toward efficiency and economy, thus giving a buyer more for his money and at the same time adding to comforts and conveniences of motoring. The principal change in engine design will, perhaps, be found in the eight-cylinder motor, in which there will be a greater diversity in the angles of cylinders in the V-type motor, and the introduction of the eight in line type, which will surely be placed on the market within the present year. This type of construction has not yet been made a commercial proposition to any

**T**O GAIN a graphic idea of the progress made in the automotive industry in this country during the past two decades, it is only necessary to contrast, in the mind's eye, the first automobile show ever held in America in Madison Square Garden on Nov. 3, 1900, when there were in all only 66 exhibits, with the 21st annual exhibition now in progress in the Grand Central Palace at which there are represented some 400 manufacturers of motor vehicles and accessories. Only those who attended that first crude exhibition can fully realize the wonderful development in all branches of the industry as compared with the latter day de luxe affairs comprising hundreds of beautiful car models shown in an elaborate decorative setting under such ideal conditions as are afforded at the spacious and elegant Grand Central Palace.

It should be remembered that 20 years ago motor cars were considered almost as freaks and attracted fully as much attention as such, as from a realization of the tremendous latent possibilities involved in this, at that time unique type



Grand Central Palace, Where 21st National Automobile Show Is Being Held.

degree, its greatest work having been performed in racing, which demands reliability, design and construction.

The V-type motor has proved its efficiency not only in eight, but also 12 cylinders, and both will this year be produced by capable makers. There is a possibility of an increase in the number of eight-cylinder makers, but the 12 type seems to be pretty well confined, there being no indication of any decided increase in their number.

Sixes of course predominate and they differ but little from last year's designs. The tendency of the designers and builders is towards greater efficiency, increased economy and simplicity.

#### Economy Important.

Economy is more important these days than ever. The price of gasoline has increased to such a degree that mileage is an important consideration, and realizing this fact the engineers have specialized on that particular point, with a desire to produce power and flexibility at

the basic principles of last year proving so popular that they are for the most part being retained.

#### Universality of Heating Equipment.

In this connection it is opportune to mention the approaching universality of the equipment of closed models with some form of heating arrangement. This is, however, not confined to enclosed types, as manufacturers now agree that the open car, if well curtained, can be heated satisfactorily also. That the latter point has passed beyond the experimental stage and is now an accepted fact in the automotive industry is evidenced by the large number of heated open passenger cars which are seen at the show.

A canvass of manufacturers reveals that more careful attention was paid to the preparation of exhibits than ever before, and this with the numerous new models on display is expected to stimulate interest in a degree that will cause

#### Accessory Exhibits Break Record.

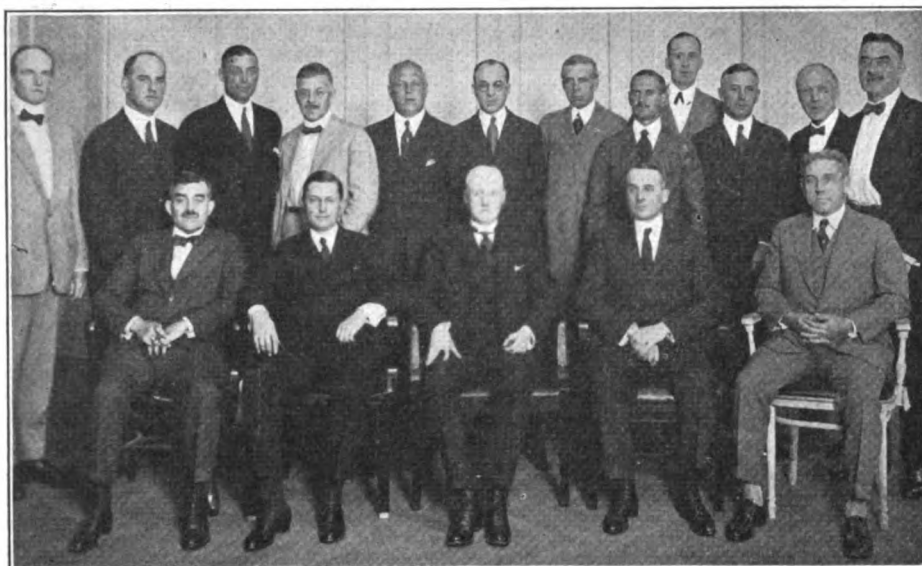
The list of accessory exhibitors at the New York show numbers 284 different concerns. It should also be borne in mind that in comparing these figures with those of last year, as a truck and tractor exhibition was then held coincident with pleasure cars, the concomitant accessories swelled the total number of exhibits, while this season it was to be expected that this department would be more largely confined to passenger car fittings and equipment. All of the latest fads, as well as the many utilities, new and old, which are now demanded as adjuncts to the modern motor car, to say nothing of equipment for private and public garages, etc., are comprehensively in evidence. The many new inventions appeal strongly to many motorists who are more or less mechanically inclined and always attract great interest.

#### List of Cars Exhibited.

Allen, American, Anderson, Apperson, Auburn.  
Briscoe, Buick.  
Cadillac, Case, Chalmers, Chandler, Chevrolet, Cleveland, Cole, Columbia, Commonwealth, Crow-Elkhart.  
Davis, Detroit Electric, Dixie Flyer, Dodge, Dorris, Dort, Du Pont.  
Elcar, Elgin.  
Fergus, F. I. A. T., Franklin, Friend, Grant.  
Hanson, Hatfield, Haynes, Holmes, Hudson, Hupp.  
Jackson, Jordan.  
Kissel, Kar, Kline.  
LaFayette, Lexington, Liberty, Lincoln, Locomobile, Lorraine.  
McFarlan, Maibohm, Marmon, Maxwell, Mercer, Milburn Electric, Mitchell, Monroe, Moon.  
Nash, National, Noma.  
Oakland, Oldsmobile, Overland.  
Packard, Paige, Pan-American, Paterson, Peerless, Piedmont, Pierce-Arrow, Pilot, Premier.  
Rauch & Lang Electric, Reo, Roamer, R. & B. Knight.  
Saxon, Sayers 6, Scripps-Booth, Standard, Stanley, Stearns, Stephens, Stevens-Duryea, Studebaker, Stutz.  
Templar.  
Velle.  
Westcott and Willys-Knight.

#### Accessory Exhibitors.

A B C Mfg. Co., Able Mfg. Co., Accurate Machine Mfg. Co., Accurate System & Manifold Co., Inc., Acme Die-Casting Corp., J. Alexander Mfg. Co., American Auto Lamp Co., Inc., American Bosch Magneto Corp., American Chain Co., Inc., American Hammered Piston Ring Co., American Pump & Tank Co., Anchor Top & Body Co., Anderson Electric & Equipment Co., Apollo Magneto Corp., Arkay Sales Co., Armstrong Cork Co., Arnold Electric Tool Co., Arrow Grip Mfg. Co., Asch & Co., Inc., Athol Mfg. Co., Atlas Crucible Steel Co., Automatic Safety Tire Valve Corp., Automobile Journal Publishing Co., Automotive Parts Mfg. Co., Auto Pedal Pad Co., Inc.  
Barnes Foundry Co., Baush Machine Tool Co., Becker Bros., Inc., John Blackledge Mfg. Co., Breeze Mfg. Co., Bridgeport Coach Lace Co., Brown Lipe Chapin Co., Brown Lipe Gear Co., Edward G. Budd Mfg. Co., Budd Wheel Corp., Bunting Brass & Bronze Co., Byrne Kingston & Co.  
A. S. Campbell Co., Champion Ignition Co., Champion Mfg. Co., Champion Pneumatic Mach Co., Chilton Co., Clark Equipment Co., Clark Turner Piston Co., Class Journal Co., Cleroline Chemical Co., Inc., Compression Tube & Tire Corp., Connecticut Electric Clock Co., Corcoran Mfg. Co., C. Cowles & Co., Cox Brass Mfg. Co.,



Officers and Directors, National Automobile Chamber of Commerce: Standing, J. S. Marvin, Assistant General Manager; Alvan Macauley, Packard; Harry S. Jewett, Paige-Detroit; R. E. Olds, Reo; W. C. Sills, Chevrolet; J. E. Kepperly, Willys-Overland; Fred J. Haynes, Dodge Brothers; Alfred Reeves, General Manager; C. W. Churchill, Winton; J. Walter Drake, Hupp; S. A. Miles, Show Manager; William E. Metzger, Columbia. Seated, A. J. Brosseau, Mack; Secretary, Roy D. Chapin, Hudson, Vice President; Charles Clifton, Pierce-Arrow, President; Windsor T. White, White, Vice President; H. H. Rice, G. M. Co., Treasurer.

less gasoline cost. This is being accomplished by refinements in carburetion, ignition and cooling systems. These certainly will show some slight improvement, but are not realized in appearance so much as in the operation of motors. There is a tendency toward a reduction in wheel and tire sizes, and a more general adoption of the 33x4 tire, instead of the 35x4½ and higher sizes. This means a saving in cost of operation not to be overlooked.

The body designers and builders have been applying themselves to the production of new types, particularly of the enclosed body, which have become recognized as an all-season rather than a winter vehicle. Coupes are more popular than ever, and it is understood that some decidedly startling results will be attained. There are, however, no particularly radical changes in body lines.

all previous show records to be surpassed.

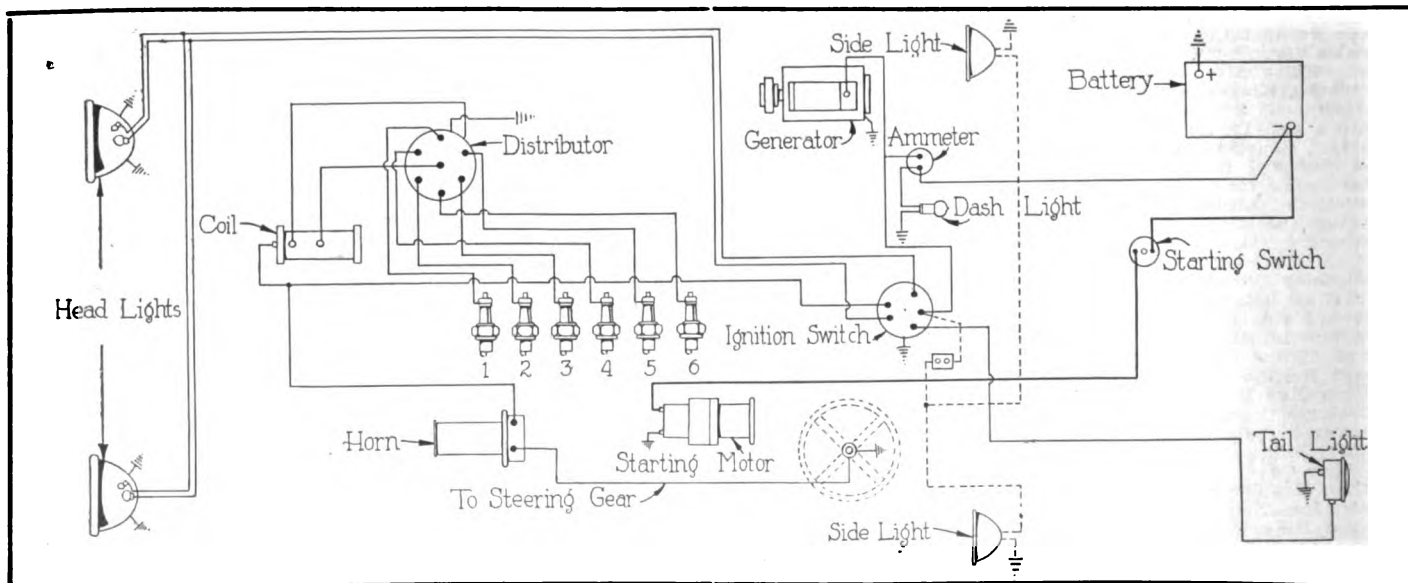
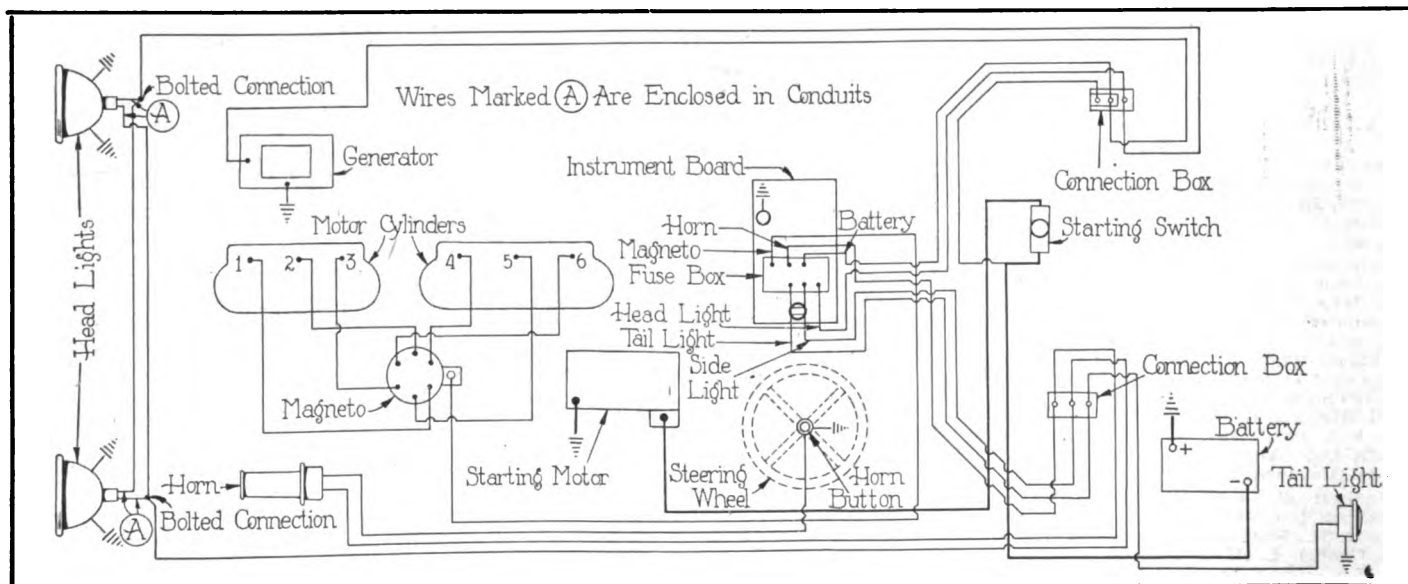
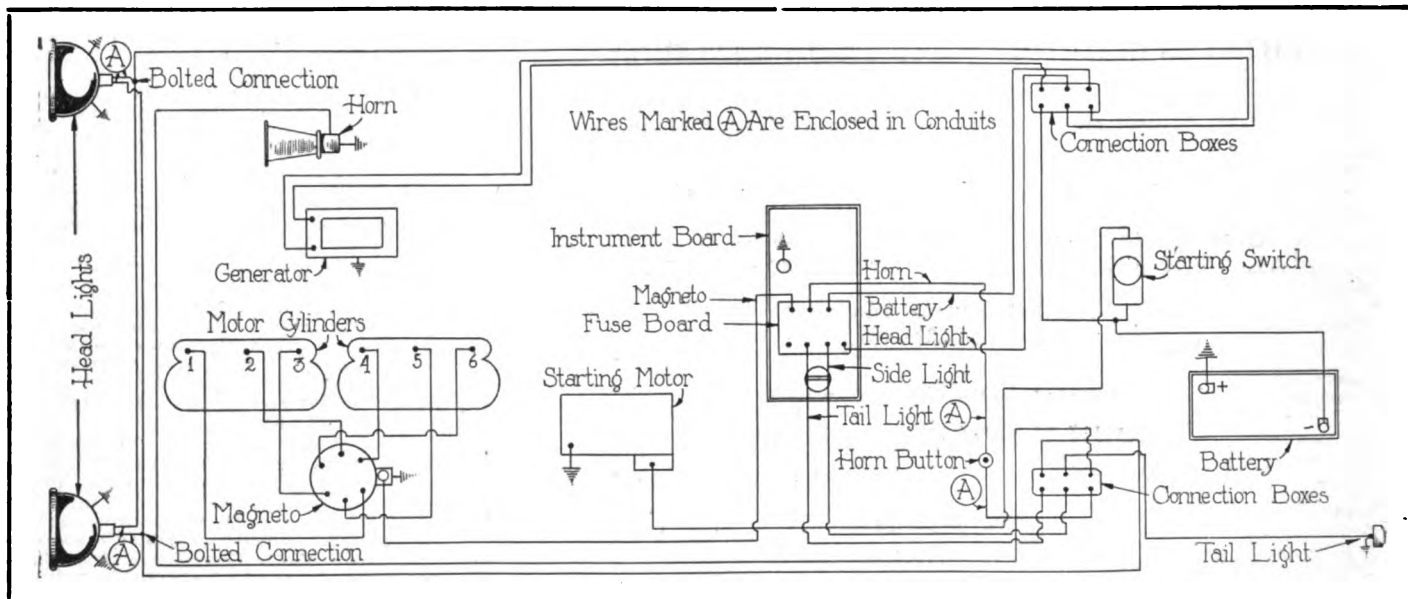
Practically every make of automobile that has earned a place in the motor car industry is represented, and there cannot fail to be found some model that will fit the pocket book of every possible prospective buyer as well as to suit the most fastidious taste.

#### Ten New Makes.

One of the features of the show is the appearance of 10 makes of cars which have never been seen at the New York show. These include the latest offerings of the Cortland Cart and Carriage Co., the du Pont Motor Co., the Friend Motors Corporation, the Gardner Motor Co., Inc., the Hanson Motor Co., the La Fayette Motor Co., the Lincoln Motor Co., the Lorraine Motors Co., the Noma Motor Corporation and the Piedmont Motor Car Co., Inc.

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son Automobile Lock Co., Jon-Con Tire  
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Co., Sales Stamping Co., Estate of J. Kel-  
lerman, Kelso Mfg. Co., Atwater Kent  
Mfg. Works, Klaxon Electric Co., Kokomo  
Electric Co.****Laidlow Co., La Lo Chemical Co., Lane  
Bros., Inc., Lauraine Magneto Co., Inc., La  
Vietes Mfg. Co., L. Lawrence & Co., Geo.  
W. LeCompte Co., Ernest Lenz, Walker  
M. Levett Co., Light Mfg. & Foundry Co.,  
Lightning Rim Corp., Link Belt Co., Long-  
din Brugger Co., Lowe Motor Supplies  
Co., A. H. Lyons & Co., McKinnon Dash  
Co., McQuay Norris Mfg. Co., Macbeth  
Evans Glass Co., Manley Mfg. Co., Paul  
M. Mark & Co., Inc., Marquette Mfg. Co.,  
James Martin, Martin Tire Corp., Mer-  
chant & Evans Co., Metal Stamping Co.,  
Midwest Engine Co., Miller Auto Supply  
Co., Mirrorlike Mfg. Co., Mirror Park Lite  
Corp., Morse Cann Co., Moswell Mfg. Co.,  
Motor Car Supplies Co., Inc., Motor Truck  
Radiator Mfg. Co., Inc., Motor Vehicle  
Publishing Co.****Nathan Novelty Mfg. Co., Inc., National  
Seal Co., Inc., New York Coil Co., No Leak  
O. Piston Ring Co., Northwestern Chemi-  
cal Co., National Carbon Co.****Packard Engineering Co., Pantasote Co.,****Perfection Heater & Mfg. Co., Perkins  
Tonneau Windshield Co., Inc., P. & T.  
Auto Supply Co., Inc., Philadelphia Stor-  
age Bat., Inc., Philbrin Corp., Pines Mfg.  
Co., William A. Pratt Mfg. Co., Wm. E.  
Pratt Mfg. Co., Prest O Lite Co.****Radcliffe Turbine Drive Co., Inc., Rajah  
Auto Supply Co., Rawhide Products Corp.,  
Inc., Record Accessories Corp., Rex Mfg.  
Co., Rimtco Lubricator Co., Inc., Geo. H.  
Rives Mfg. Co., Inc., Russel Sales Co.,  
Joseph T. Ryerson & Son, Salmon Falls  
Mfg. Co., Sargent & Ham Co., Schaap Co.,  
A. Schraders Son, Inc., Sedgwick Sales Co.,  
Sewell Cushion Wheel Co., C. A. Shaler  
Co., H. B. Shontz Co., Inc., Simms Mag-  
neto Co., Sparks Withington Co., Split-  
dorf Electrical Co., John T. Stanley Co.,  
Inc., States Sales Syndicate, Inc., Steel  
Spring Piston Ring Co., Stenco Engineer-  
ing Co., Stewart Warner Speedometer  
Corp., Stokes Engineering Co., Inc., Strom-  
berg Motor Devices Co., Stuart Bell Corp.,  
Superior Lamp Mfg. Co., Inc., Thomas  
Spark Plug Co.****Tonneau Shield Co., Inc., Tiltlok Steer-  
ing Wheel Co., Trexler Co., Triple Action  
Spring Co. of N. Y., Inc.****Universal Shock Estimator, Inc., Up-  
holstery Div. Tanner's Council of the U.  
S. of America, U. S. Light & Heat Corp.****Vacuum Oil Co., Vacuumeter Co., Van  
Siclen Speedometer Co., Veeder Mfg. Co.,  
Vibrator Specialty Co.****F. W. Wakefield Brass Co., Waltham  
Watch Co., Wasson Piston Ring Co., Wau-  
kesha Motor Co., Weaver Mfg. Co., West-  
inghouse Elec. & Mfg. Co., Westinghouse  
Union Battery Co., Weston Electrical In-  
strument Co., Wheeler Schebler Carburet-  
or Co., W. S. White Dental Mfg. Co., Whit-  
ney Mfg. Co., Wildenburg Bros., Willard  
Storage Bat. Co., K. R. Wilson, Wire  
Wheel Corp. of America, Witherbee Stor-  
age Bat. Co., Inc., Woodworth Mfg. Corp.,  
Division of Cong. Utilities Corp.,  
World Metal Products Corp.****X Laboratories.****Yale & Towne Mfg. Co.****Zapon Leather Cloth Co., Zenith Car-  
buretor Co.****SCHEDULE OF MEETINGS AND BANQUETS FOR NEW YORK SHOW  
WEEK.****MONDAY, JAN. 10.****10:00 a. m. and 2 p. m.—Automotive Service Associations Convention,  
Hotel Commodore.****2:30 p. m.—Rubber Association of America, Annual Meeting, Yale Club.****7:00 p. m.—Rubber Association of America, Banquet, Waldorf-Astoria.****TUESDAY, JAN. 11.****10:00 a. m.—N. A. C. C. Foreign Trade Committee Meeting, N. A. C. C.  
Headquarters.****10:30 a. m.—N. A. C. C. Patents Committee Meeting, Headquarters.****10:00 a. m. and 2 p. m.—Society of Automotive Engineers, Standards Com-  
mittee Meeting, 29 West 39th Street.****10:30 a. m.—N. A. C. C. Highways Committee Meeting, N. A. C. C. Head-  
quarters.****2:30 p. m.—N. A. C. C. Motor Truck Committee Meeting, N. A. C. C. Head-  
quarters.****7:00 p. m.—National Automobile Chamber of Commerce Banquet, Hotel  
Commodore.****8:00 p. m.—Society of Automotive Engineers, Aeronautic Session, 29 West  
39th Street.****WEDNESDAY, JAN. 12.****10:00 a. m.—N. A. C. C. Directors' Meeting, N. A. C. C. Headquarters.****10:00 a. m.—Society of Automotive Engineers Meeting, 29 West 39th Street.****2:00 p. m.—Society of Automotive Engineers, Body Engineering, Aeronau-  
tic and Chassis Sessions, 29 West 39th Street.****2:00 p. m.—Motor and Accessory Manufacturers' Association Banquet, Ho-  
tel Commodore.****9:00 p. m.—Society of Automotive Engineers, Carnival, Hotel Astor.****THURSDAY, JAN. 13.****10:00 a. m.—Society of Automotive Engineers, Fuel Session, 29 West 39th  
Street.****2:00 p. m.—Society of Automotive Engineers, Fuel and Highway Session,  
29 West 39th St.****7:00 p. m.—Society of Automotive Engineers, Banquet, Hotel Astor.****The Automobile Dealers' Association of New York city will keep open  
house all the week at its headquarters, Broadway and 61st Street.**

# Monthly Wiring Diagram, No. 11





## New Dort Models Seen at New York Show

ONE of the outstanding features of the New York automobile show, now in progress at the Grand Central Palace, is the initial appearance of an entirely new family of Dort cars exhibited by the Dort Motor Car Co., Flint, Mich., at booth No. A-10.

Some time ago the Dort company opened a new body factory at Kalamazoo, Mich., in charge of William A. Henderson, formerly chief designer for the well known body builder, Holbrook & Co. Mr. Henderson, who has personally designed more special coaches for royalty abroad and celebrities at home than almost any other man, has been working very closely with J. D. Dort, president of the Dort company, and it may be said, without fear of contradiction, that the result of their collaboration, as exemplified by the cars now on view, fully justifies the reputation and endeavors of these gentlemen.

The new Dort offerings comprise four models, the five-passenger touring car, three-passenger roadster, five passenger sedan and three-passenger coupe.

The radiator on these new models is indicative of a certain European maker, but still not enough to impair the Dort personality. There reminiscence ends. In fact, "personality" is borne in on one upon viewing the 1921 Dort for the first time. These cars are almost exclusively Dort and distinctively "thoroughbred."

A beautiful, soft green, designated as Dort green, is the color used on the entire line. The chassis and fenders are enamelled black. The long, sleek lines are not deceptive as to stretch room, as is so often the case. There is room and plenty of it for both driver and passengers. However, storage space has not

been sacrificed. Roomy pockets in the doors and compartments under the seats, plus space under the rear deck of the roadster and coupe, provide for luggage, tools and miscellaneous articles. A unique innovation is the pocket in the back of the front seat of the touring car for the storage of side curtains.

The open models are fitted with a one-man type top attached to the windshield, which is double adjustable, with the lower glass curved to fit top of cowl. The side curtains are arranged to open and close with the doors.

Non-skid Goodyear 30 by 3½-inch tires are fitted both front and rear.

### Appointments of Coupe and Sedan.

The appointments of the sedan and coupe models are complete indeed. The floors are carpeted to match the upholstery, while silk curtains of the same color, fitted on spring rollers, cover the windows. The windows are heavy plate glass fitted with Dura window regulators. The windshield is built in, with rain visor and adjustable for ventilation.

The dome lights are silver finished, which gives an unusual touch to the interior. The cowl board is illuminated by concealed lights.

There are full front and rear seats in the sedan, while a divan for two and a driver's seat, set slightly forward, is the seating arrangement in the coupe. The sedan front and rear seats measure 45 and 47 inches respectively with cushions nine inches deep. The cushions in the coupe are 9½ inches deep and the seat 46 inches wide.

All the tires on the sedan and coupe are non-skid Goodyear, but larger than those on the open models, being 31 by four inches.

### No Change in Chassis.

The same well known, time proven and economical Dort chassis is used as heretofore. Endurance runs, economy tests and the daily testimony of over 80,000 owners have proved it all sufficient.

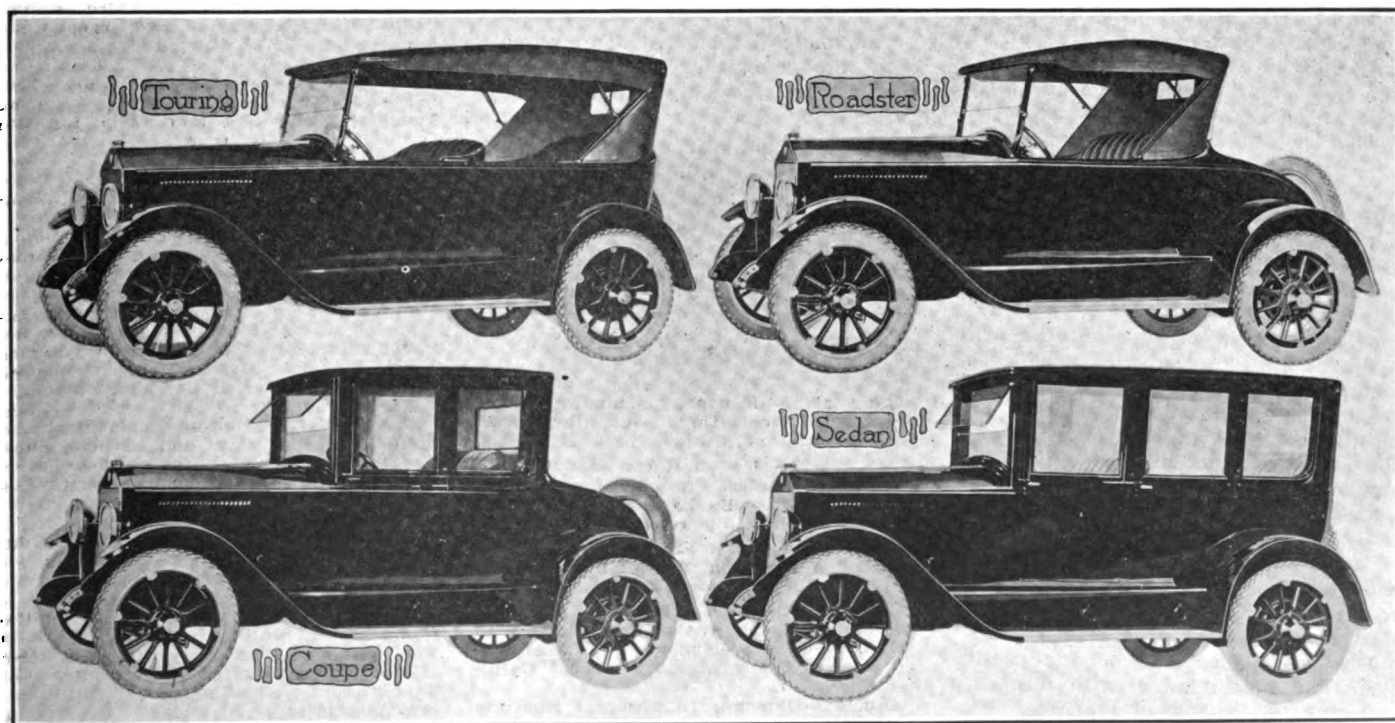
A four-cylinder Dort motor is used, with 3½-inch bore and five-inch stroke. The cylinders are cast en bloc, with separate head to facilitate the removal of carbon and the regrinding of valves. All cylinders and heads are water tested under high pressure, both before and after machining, to detect faulty castings. The valve operating tappets, springs and adjustments are easily accessible by removing sheet steel cover plates. These plates are lined with felt to exclude dust, retain oil and deaden engine noise.

The pistons are fitted with three rings above the piston pin. A unique special arrangement of grooves and holes to prevent oil getting past the rings is provided, thus eliminating the smoke nuisance.

The splash system of lubrication is used, the oil being drawn by a plunger pump from the oil pan and delivered through a tube to oil troughs. This pump, which is operated by an eccentric on the camshaft, keeps the oil at a constant level in the troughs, into which the connecting rods dip.

The thermo-syphon system of cooling is used. A four-blade fan is driven by a one-inch leather belt, in which stretch is provided against by a quick adjustment feature.

The transmission is the selective, sliding gear type with three forward and one reverse speed. A cone clutch is used.



New Models of Dort Cars Shown for First Time at New York Show in Grand Central Palace.

## DETAILED SPECIFICATIONS OF DORT CAR.

**Engine**—Four cylinders cast en bloc. Cylinder head removable to permit removal of carbon and regrinding of valves. Bore— $3\frac{1}{4}$  inches, stroke five inches.

**Valves**—Located on right side, specially designed to prevent warping.

**Pistons**—Very light, cast iron, with three rings and special arrangement for preventing smoking.

**Wristpins**—Liberal in size, hardened and ground.

**Connecting rods**—Drop forged steel, double heat treated, the lower one bushed with a special die cast bearing metal, the upper end with phosphor bronze. Shims are provided for adjustment of lower bearings.

**Crankshaft**—Heavy forging of .40 carbon steel, double heat treated, carefully balanced, and all wearing surfaces ground. Upper half of crank case, cast iron, and carries crankshaft bearings by removable caps provided with shims for adjustment. Oil pan is a steel stamping, easily removable.

**Cooling**—Thermo-syphon with extra liberal water jackets and cellular type radiator, and a four-blade fan driven by one-inch belt.

**Lubrication**—Plunger pump feeding oil troughs. Connecting rod dipper splash oil from constant level troughs to all parts of engine.

**Carburetor**—Carter improved side outlet, easy starting and unusually economical Ignition—Connecticut battery system; switch, combined with that controlling lights, is carried on instrument board.

**Starter**—Equipped with Bendix drive geared to flywheel; storage battery.

**Lighting**—Gear driven generator; ammeter with switches on cowl instrument board.

**Clutch**—Leather faced cone with means for insuring easy engagement.

**Transmission**—Selective, three speeds forward, one reverse, in unit with motor.

**Rear Axle**—Three-quarter floating,

nickel steel gears; differential and pinion adjustable in both directions from outside of case; propeller shaft mounted on Timken roller bearings; axle shafts are on Hyatt high duty roller bearings; axle shafts nickel steel, heat treated.

**Front Axle**—I-beam; steering knuckles and levers drop forged steel, double heat treated.

**Wheels**—Artillery type, 12 spokes; demountable rims. Front wheel bearings, Timken rollers.

**Front Springs**—Semi-elliptic, two inches wide by  $37\frac{1}{2}$  inches long.

**Rear Springs**—Cantilever, two inches wide by 48 inches long.

**Brakes**—Emergency, internal expanding, operated by hand lever; service, external contracting, operated by pedal. Drums, 12 inches diameter.

**Steering Gear**—Improved nut and screw type.

**Gasoline Tank**—Located in rear of chassis; vacuum feed to carburetor; capacity, 13 gallons; Stewart vacuum system.

**Tires**—Goodyear,  $30 \times 3\frac{1}{2}$  inches; non-skids both front and rear.

**Frame**—Extra heavy pressed steel, narrowed in front to permit short turning radius.

**Fenders and Hood**—Heavy gauge steel with baked enamel finish; hood and radiator same color as body.

**Top**—One-man type, attached to windshield.

**Curtains**—Side curtains open with doors; special pocket in seat back provides storage space.

**Windshield**—Double adjustable with lower glass curved to match top of cowl. Horn—Electric, mounted under hood; button on top of steering column.

**Speedometer**—Stewart, on cowl instrument board; illuminated by instrument board lamp.

**Tools**—Standard tool kit in bag, with jack, tire pump and tire repair outfit.

**Wheelbase**—108 inches.

The rear axle is of the three-quarter floating type. The front axle I beam is drop forged with integral yokes and pads from .30-.40 carbon open hearth steel. The forgings receive a double heat treatment to impart extreme toughness.

Half-elliptic springs, two inches wide by 37 inches long, are used in front. The rear springs are cantilever shackled at the front end and attached firmly to the axle at the rear end. The width is two inches and length 48 inches.

#### Ignition and Starting System.

The Connecticut battery system of ignition is used. The switch, combined with that controlling the lights, is carried on the instrument board.

The starter is automatically thrown into gear with the engine flywheel by a foot operated switch in connection with a Bendix drive on the starter shaft. The engine is turned at a speed far in excess of the actual requirements, and usually starts at the first impulse. At the first explosion in the cylinders the gears are automatically disengaged.

The generator is gear driven and entirely automatically in action, by reason of its third brush control and automatic cut-out. The battery is of six volts, 94-ampere hours capacity, carried in a sheet steel box under the front seat.

The head lamps are of fine quality black and nickel finish, with focussing screw on the outside of the case. The tail lamp is mounted on the tire and license plate carrier. The instrument

board lamp is located so as to illuminate the speedometer and ammeter and is provided for by a separate switch on the left. An ammeter indicates the rate at which the battery is being charged or discharged. It also shows instantly if any of the electrical connections become grounded so as to discharge the battery.

The single or grounded wire system is used throughout the car, and all wires are protected from injury either by conduits or by armor on individual wires.

The front and rear wheels are of artillery type, each with 12 hickory spokes. The rims are clincher demountable with six supporting lugs, and are held in place by six bolts and wedges. The front wheel bearings are Timken rollers.

## Coming Events

Jan. 25-27—Kentucky Hardware and Implement Association, Louisville; Secretary, J. M. Stone, Sturgis, Ky. Exhibit.

Jan. 25-28—Oregon Retail Hardware & Implement Dealers' Association Convention, Portland. E. E. Lucas, Secretary, Hutton Building, Spokane, Wash.

Jan. 26-28—North Dakota Implement Dealers' Association, Fargo; Secretary, R. A. Lathrop, Hope, North Dakota. Exhibit.

Jan. 29-Feb. 4—Chicago, Ill., National Passenger Car Show, Coliseum, N. A. C. Jan. 30-Feb. 5—Hudson, N. Y., Annual Automobile Show, Armory. J. J. Callahan, Manager.

Jan. 31—Chicago, Ill., Annual Meeting, National Automobile Dealers' Association, La Salle Hotel.

Feb. 2—Chicago, Ill., Winter Meeting,

Society of Automotive Engineers, Hotel Morrison.

Feb. 5-12—Minneapolis, Minn., Annual Winter Automobile Show, Minneapolis Automobile Trade Association. Walter R. Wilmut, Manager, 709 Andrus Building.

Feb. 6-12—Newburgh, N. Y., Annual Automobile Show, Benefit Companies E and L, State Armory. J. J. Callahan, Manager.

Feb. 7-12—Columbus, O., National Tractor Show, Columbus Tractor and Implement Club, Ohio State Fair Grounds.

Feb. 7-12—Parsons, Kan., Fifth Annual Automobile and Accessory Dealers' Association Show, Passenger Cars, Trucks, Tractors and Accessories. W. N. Chapman, Secretary, 1818 Broadway.

Feb. 8-10—Oklahoma Hardware and Implement Association Convention, Oklahoma City. W. B. Porch, Secretary-Treasurer, Oklahoma City.

Feb. 10—Columbus, O., Tractor Meeting, Association of Automotive Engineers.

Feb. 12-19—Kansas City, Mo., Annual Passenger Car and Truck Show, Kansas City Motor Car Dealers' Association. Ed. E. Peake, Manager.

Feb. 14-19—St. Louis, Mo., 14th Annual Show, Passenger Cars, Trucks and Accessories. Robert E. Lee, Manager, 3124 Locust Street.

Feb. 18-28—San Bernardino, Cal., Show, Passenger Cars, Trucks, Tractors and Accessories. Fred M. Renfro, Manager, Chamber of Commerce Building.

Feb. 19-26—Newark, N. J., Passenger Car, Truck and Accessory Show, Newark Auto Trade Association, First Regiment Armory. Claude E. Holgate, Manager.

Feb. 20-26—Pittsfield, Mass., Annual Automobile Show, Benefit Company F, State Armory. J. J. Callahan, Manager.

Feb. 21-26—Deadwood, S. D., Eighth Annual Automobile Show, Auditorium, Passenger Cars, Trucks, Tractors and Accessories.

Feb. 21-26—Bethlehem, Pa., Seventh Annual Show, Passenger Cars and Accessories, Coliseum, Broadway and Montclair streets. J. L. Elliott, Manager, 1038 Norway Place.

Feb. 21-26—Elmira, N. Y., 11th Annual Passenger Car Show, Elmira Auto Club, State Armory. H. S. Bryan, Manager, 210 East Water Street.

Feb. 28-March 5—Bethlehem, Pa., Truck and Tractor Show, Coliseum, Broadway and Montclair Streets, J. L. Elliott, Manager, 1038 Norway Place.

March 1-5—Quincy, Ill., Third Annual Auto Show, Passenger Cars, Trucks and Accessories. J. W. Hart, Secretary, Whig Journal.

March 7-12—Indianapolis, Ind., 22nd Semi-Annual Show, Passenger Cars, Trucks, Accessories and Farm Lighting Outfits. John B. Orman, Manager, 338 North Delaware Avenue.

March 7-12—Paterson, N. J., Fifth Annual Show, Passenger Cars, Trucks, Tractors and Accessories, Fifth Regiment Armory. H. MacGinley, Manager.

March 7-12—Scranton, Pa., 11th Annual Show, Passenger Cars, Trucks, Tractors and Accessories. Hugh B. Anderson, Manager, Board of Trade Building.

March 12-19—Boston, Mass., 18th Annual Automobile Show, Boston Automobile Dealers' Association, Mechanics' Building. Chester I. Campbell, Manager, 5 Park Square.

March 14-19—Trenton, N. J., Sixth Annual Passenger Car and Truck Show, Trenton Automobile Trade Association, Second Regiment Armory. Frederick Perry, Jr., Manager, West, State and Willow Streets.

March 15—Fort Worth, Tex., 24th Annual Southwestern Exposition and Fat Stock Show. Passenger Cars, Trucks and Tractors. M. Sasson, Jr., Secretary.

March 20-26—Torrington, Conn., Show, Company M, State Armory. J. J. Callahan, Manager, Box 1186, Pittsfield, Mass.

March 26—York, Pa., Passenger Car, Truck and Tractor Show, York Auto Dealers' Association.

April 3-9—Gloversville, N. Y., Annual Gloversville-Johnstown Automobile Show, State Armory. J. J. Callahan, Manager.

## Kelsey Car Embodies Unique Features in Design

**M**ARKING the culmination of more than seven years of constant research, experimentation and practical tests, the Kelsey six-cylinder car, embodying two radical departures in automotive engineering, has just been brought out by the Kelsey Motor Co. of Newark, N. J. It employs an entirely new type of friction transmission and clutch, which are completely enclosed within the rear axle housing. It also has an internal gear final drive, being stated to be the first passenger motor vehicle to use this type of construction, which has had a number of years successful use in motor trucks. The gear-set and clutch and the large differential ring gear and pinion of the conventionally designed car are thus eliminated in the new Kelsey design.

The inventor of this unusual combination of practical engineering principles is C. W. Kelsey, formerly sales manager of the Maxwell-Briscoe Motor Co. of Newark, N. J., which is manufacturing this new six-cylinder car.

The Kelsey car is stated to be the first to successfully employ the friction type of transmission, admittedly the ideal method of speed change mechanism when used under proper working conditions. As in any modern car, the power is conveyed to the rear axle unit through a direct shaft, completely enclosed, only instead of sending this power through a clutch and gearset before delivering it to the rear axle, the Kelsey design takes the power back without transmitting it through any intermediary mechanism whatever. The friction disc and friction wheel and the friction clutch are all embodied in the rear axle unit.

### Summarization of Advantages.

Its advantages from the car owner's viewpoint may be summarized as unusual smoothness and silence of operation; remarkable flexibility and positive traction at all times; reduced operating and maintenance expense; simplicity and ease of operation; and freedom from vibration with a consequent decrease in wear of the parts. Where a car of the conventional type loses 25 per cent. of the power of its engine between the flywheel and the road wheels when travelling on high gear, it is pointed out that the Kelsey loses only 13 per cent. at these points. With this car it is not necessary to shift to neutral position when the car is brought to a stop.

There is nothing experimental about the new car, as it is claimed that every part has been worked out in detail after careful research, numerous experiments and practical tests extending over seven years.

Body styles include a touring car, runabout and sedan.

The new car does not differ in appearance from conventional designs, and from radiator to the dashboard it is the same, as the distinctive points are located to the rear of the flywheel.

The engine used in the Kelsey is a six-cylinder Falls valve-in-head type, with a

bore of  $3\frac{1}{2}$  inches and a stroke of  $4\frac{1}{4}$  inches. The rated horsepower is 23.44, but the engine develops 46 horsepower at 2290 revolutions a minute on the block. Its maximum speed is 3990 revolutions a minute. The crankshaft is a Wyman-Gordon high-speed design.

Ignition is by the Atwater Kent battery coil system and starting and lighting are provided by the Bijur six-volt, two-unit system. The battery is a six-volt, 94-ampere Willard. The carburetor is a Tillotson and the gasoline is supplied by the Stewart vacuum system from a 14-gallon tank at the rear of the frame.

Lubrication of the engine is by pump and splash. Grease cups are provided on the springs and at other points of friction.

With a wheelbase of 116 inches the Kelsey car has a road clearance of 10 inches, or more than is usual on cars of this size.

### Body Styles.

The body styles include a touring car

### Specifications in Detail.

The specifications in detail follow:

Engine—Six-cylinder Falls, valve-in-head; bore,  $3\frac{1}{2}$  inches; stroke,  $4\frac{1}{4}$  inches; S. A. E. rating, 23.44 horsepower. Develops 46 horsepower at 2290 revolutions per minute. Maximum speed, 3990 revolutions per minute. Wyman-Gordon high-speed crankshaft. Lubrication by pump and splash.

Carburetor—Tillotson.

Fuel Supply—Stewart vacuum system and 14-gallon rear tank.

Ignition—Atwater Kent.

Starting and Lighting—Bijur, six-volt, two-unit system.

Battery—Willard, six-volt, 94-ampere.

Transmission and Clutch—Patented Kelsey friction.

Brakes—Service, external on 12-inch rear wheel drums and emergency on jack-shaft.

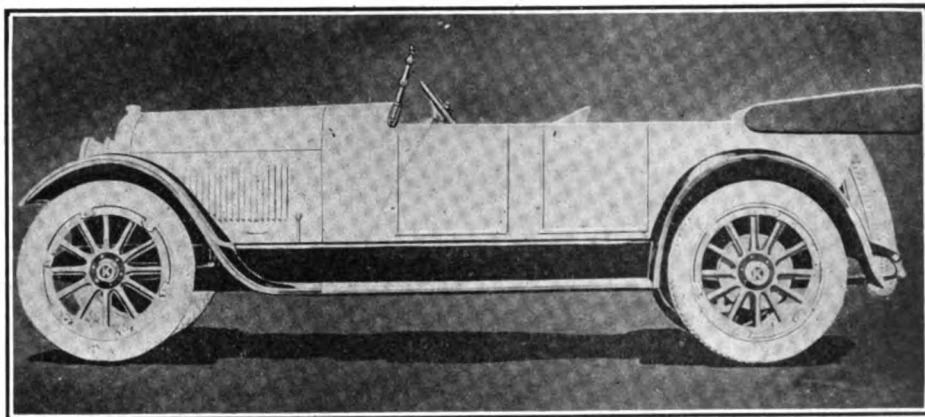
Steering Gear—Irreversible worm and wheel.

Axles—Front, drop forged,  $2\frac{1}{2} \times 1\frac{1}{4}$  inches; rear, full floating; high gear ratio, 4.5 to one. Spiral internal gear drive.

Springs—Perfection, semi-elliptic. Front,  $36 \times 1\frac{1}{2}$  inches; rear,  $53 \times 2\frac{1}{4}$  inches.

Frame—Seven-inch pressed steel channel section,  $5/32$  inch stock.

Wheels—Artillery; wheel bearings. Timken roller.



Kelsey Six-Cylinder Car Just Brought Out by Kelsey Motor Co., Newark, N. J.

selling at \$1800, a runabout listed at \$1750 and a sedan for \$2700.

### Personnel of Kelsey Co.

The officers of the Kelsey Motor Co. are: President, Ernest B. Slade, president Beaver Machine & Tool Co. and American Foundry Co.; vice president, M. F. Howland, president and general manager, Luthy Storage Battery Co. and president Newark Industries, Inc.; vice president and general manager, C. W. Kelsey, formerly sales manager, Maxwell-Briscoe Motor Co.; treasurer, E. J. Churchill, treasurer, American Seed & Seed Tape Co. and Hanser Advertising Agency; secretary, E. D. Norman, formerly vice president of the Maxwell-Briscoe Motor Co.

In addition to the officers, the board of directors includes Charles W. Hoyt, president Hoyt's Service, Inc.; Henry Kohl, president National Grocery Co.; Charles Abbott, director, Luthy Storage Battery Co.; John R. Thomas, L. S. Tyler, president Tyler Manufacturing Co.; T. J. Stewart, Thomas J. Stewart & Co.; E. L. R. Cadmus, Ogden & Cadmus, and Arthur Jennings, manager Worthington Pump and Machinery Corporation.

Rims—Stanweld, split type.  
Tires—32x4 inches, non-skid rear; Fisk.  
Wheelbase—116 inches; road clearance, 10 inches.

Weight—Touring car, 2350 pounds.  
Top—One-man "Neverleak," nickel plated rear curtain lights; side curtains swing open with doors.

Speedometer—75-mile Stewart-Warner.  
Upholstery—Real leather, tan Spanish, French pleats. Sedan, French gray cloth. Finish—Dark green.

Equipment—Spare rim, tool kit, jack, pump, tire repair kit, starting crank, rim wrench, switch keys, curtain rods.

Price—Touring car, \$1800; runabout, \$1750; sedan, \$2700.

### J. B. S. MANUFACTURING CO. SUCCEEDS ELLIS-SMITH CO.

The J. B. S. Manufacturing Co. of Elmira, N. Y., has purchased the business of the Ellis-Smith Manufacturing Co. and the entire line of E. & S. products is now under production in the J. B. S. Co.'s plant on Fox street, Elmira. The purchasing concern has an enviable reputation for progressiveness, and is composed of men experienced in the automotive industry. The company purposes to add several new lines to its output in season for spring sales.

## Effects of Abuse of Automobile During First 1000 Miles of Driving

THE effects of the abuse of a car during its first 1000 miles of driving are likely to be felt all through its subsequent period of service. In such a piece of intricate and delicately adjusted piece of mechanism there are many moving surfaces which have clearances of less than .0005 of an inch, and until these surfaces have rubbed together and worn away just a slight film of their metal, they are likely to bind on the slightest provocation. Driving at excessive speed before the mechanism has been run in will cause undue friction with its attendant heat and possible evil consequences.

### Lubrication.

It may happen that in a factory where many scores of cars are being shipped each day, the workman charged with the job of attending to the lubrication of each car may through oversight skip a unit. He may fail to fill all of the grease cups or neglect certain oil holes. The agency which distributes the car may in turn not go over it carefully enough to discover the omission.

The very first thing to do on receiving a new car is to go very carefully over the lubrication system to make sure that it is ready for business. A chart is usually supplied with each new car and although the owner may not be familiar with that special make of car, the chart will show plainly the location of each grease cup, oil hole and the lubrication system complete. If the gearset and rear axle housings are filled with grease they should be removed and a gear oil of light body substituted for winter use and heavy for summer. The use of 600 W is considered about right by many manufacturers and many dealers stock this number. If it cannot be obtained the use of ordinary steam cylinder oil will do, as this has about the correct body for summer or winter use.

### Storage Battery.

In these days when freight shipments are often delayed the storage battery often loses much of its potentiality before it reaches the hands of the owner, in spite of the fact that it left the factory in good order. The battery should be tested with a hydrometer to see that it is up to full capacity. If the owner is not equipped or does not feel competent to do this himself he should have it done at the service station. Care should also be taken that all of the cells are filled with distilled water and to the proper height.

In the rush of getting the car to the customer the dealer may have neglected to pump up the tires to the proper pressure, or one of them may have a slow leak in its valve, so that it soon becomes under inflated. The pressure on all tires should be checked up with a gauge.

### Driving the Car on the Road.

Having made these inspections it may be assumed that the car is ready for the road. The driver should not try to see

how fast he can go, but it should be remembered that all through the intricate mechanism, wherever moving parts come in contact, a wearing process is going on, and excessive speed may cause serious damage. Until the parts have become worn in it is difficult for the lubricant to get in between them and reduce friction. Do not race the engine, nor make it do more work than is necessary. Do not throttle down too low on high gear. In climbing hills do not try to see how far you can go on high; change down to a lower gear and relieve the stiff engine. Do not attempt stunts until the mechanism has loosened up a little. If the engine smokes, do not reduce the oil level. The smoke is a sign that the lubricant is reaching the working surfaces.

It will probably be found that the new car consumes more gasoline than had been expected. This is but natural, for the stiffness of the mechanism puts an extra load on the engine and calls for excessive power, which means more fuel consumption. It will probably be found that the carburetor will have to be adjusted after the car has been worked in, an excessively large opening being required by a new engine.

After the car has been in operation for a week the starting and lighting system should be checked up. The charging rate may possibly need readjustment. The motorist who does very little night driving will probably overcharge his batteries, since he consumes very little current for lights, while the reverse is true of the driver who uses his car frequently at night and little in the daytime. After a week's operation the motorist should go over the whole car, tightening loose parts. Spring clips may have stretched, bolts may have loosened or nuts may need a little attention from the wrench.

The clutch of the new car needs particularly careful handling. It will be stiff in action and it must not be slipped. Neither should the driver keep the foot on the clutch pedal when driving, as this has a tendency to cause the plates of the clutch to separate slightly, allowing the clutch to slip. Engage and disengage the clutch slowly and gently. The same applies to the gears of the gear set. If the gears do not seem to mesh easily at first, do not force them into place. Shift into a forward gear, then bring the shift back, meshing the gears without rasping the teeth. Run the car on slow speed for a while if necessary, but above all avoid harsh gear changes, as the edges of the teeth are burred by the process, and hard shifting of the gears is sure to follow later.

The finish of the car, the lustrous enamel and varnish, need very tender handling in the early months of their service, or their beauty may be permanently destroyed. When the car comes from the factory the finish is dry, but has not yet "set;" it is still soft and

slight abrasions will injure it. Mud spots should be removed at once, using cold water, poured on in a gentle stream. A large sponge soaked with cold water and pressed out on the surface works admirably. If a stream of water from a hose is used the pressure should be low. After the car has been running about a month it is a good plan to use a good body polish on the varnished surface, following the directions given with the preparation. The top and curtains should be given some attention, a brisk rubbing with a stiff brush once a week and a cleaning with soap and water as needed.

### CARE OF PASSENGER CAR WHEELS.

The wood wheels with which the average passenger car is equipped need little attention, but there are certain small formalities that must be attended to if the wheel is to go on performing its strenuous duty. The spokes must be tightened and the wood be given protection at least twice every year. Paint and varnish protect the wood against the entrance of water, which will rot it. When the paint chips off the wood may easily become affected even though it has been treated before it was assembled in the wheel. Spoke looseness on cheap wheels may be generally remedied by giving the wood proper treatment. If the spokes become loose at the felloe or hub, they may be tightened by the use of wedges. In the case of rear wheels the brake drum bolts are rarely if ever given any attention, yet these bolts do strenuous service; they should be tightened whenever opportunity offers. Hub bolts on the front wheels, if tightened, will never give trouble, causing spoke looseness, which in turn will produce squeaking.

### GREASE FOR WATER PROOFING LEATHER.

Take 24 parts of oleic acid, six of crude setaric acid, 18 of ammoniacal soap, three of extract of tannin and 24 of water. Melt the oleic acid together with the setaric acid, then add gradually the ammoniacal soap, the extract of tannin and, finally, the water. The ammoniacal soap is obtained by adding to heated oleic acid, caustic ammonia until, after continued stirring, the odor of ammonia remains apparent and the whole congeals to a jelly-like mass. By adding a solution of two parts of sulphate of iron in six of water the grease will assume a deep black color and is then very suitable for treating boots and shoes.

Do not use gasoline to clean leather unless you wish to crack it. Plain water with a few drops of ammonia will remove the dirt, after which the upholstery should be rubbed briskly with a soft cloth. An excellent leather dressing is made by combining two parts of linseed oil to one of turpentine.



# NOTES OF INDUSTRY AND TRADE

## PENNSYLVANIA AND ATLANTIC SEABOARD HARDWARE SHOW.

The 20th annual exhibition of the Pennsylvania & Atlantic Seaboard association will be held at the Commercial Museum, Philadelphia, Feb. 8-11. This association comprises approximately 1400 hardware dealers in the states of Pennsylvania, New Jersey, Delaware and Maryland. It has always maintained that the hardware store is one of the most consistent channels for the distribution of automobile accessories and advises its members to handle this line of goods. The motto is stated to be "Buy of the Exhibitors," and the members are said to consistently live up to it.

The secretary of the association, Sharon E. Jones, 1314 Fulton building, Pittsburgh, Pa., will gladly supply a diagram of floor spaces and other show information.

## NEW YORK ELECTRIC VEHICLE SHOW.

Arrangements are being made for an unusual display of electric motor cars under the auspices of the New York Edison Co., to be held in its big show room at Irving place and 15th street, New York city, and manufacturers of electric trucks, industrial trucks, passenger cars and batteries and accessories have been invited to exhibit their products.

Street trucks and passenger cars will be shown during the week of Jan. 19-Feb. 5, while industrial trucks will be exhibited the following week. Batteries and other equipment and accessories will be on view during both weeks.

Charles R. Skinner, Jr., of the Automobile Bureau of the New York Edison Co. is in charge of the arrangements.

## MERCHANTS & EVANS CATALOGUE.

Merchant & Evans Co., the well known manufacturing, importing and jobbing concern, whose general sales department is located at Washington avenue and 21st street, Philadelphia, Pa., has just issued a new catalogue of the "M & E" Multiple Dry Disc Clutch and Universal Joint products which has evidently been prepared with extreme care as regards to quality and material, binding, text, cuts, etc. It is put out in convenient loose page form with a substantial cover so that the material can be arranged to best suit individual needs and convenience. Special attention should be made of the pages containing useful information on "Automotive Clutch Engineering," "Universal Joint Engineering" and the "M & E" Chassis Oiling System."

M & E Universal joints, M & E multiple dry disc and Hele-Shaw clutches and M & E grease cups will be on exhibit at both the New York and Chicago national shows.

## Piston Ring Makers Are Optimistic

An exceedingly optimistic outlook for the piston ring business during 1921, based on trade conditions in the field, was the prevailing opinion expressed by the district sales managers of the American Hammered Piston Ring Co. at its recent annual sales conference.

This conference, which covered a period of five days, during which time every phase of American Hammered sales policy and plans was discussed, was the first meeting of this kind held since 1919.

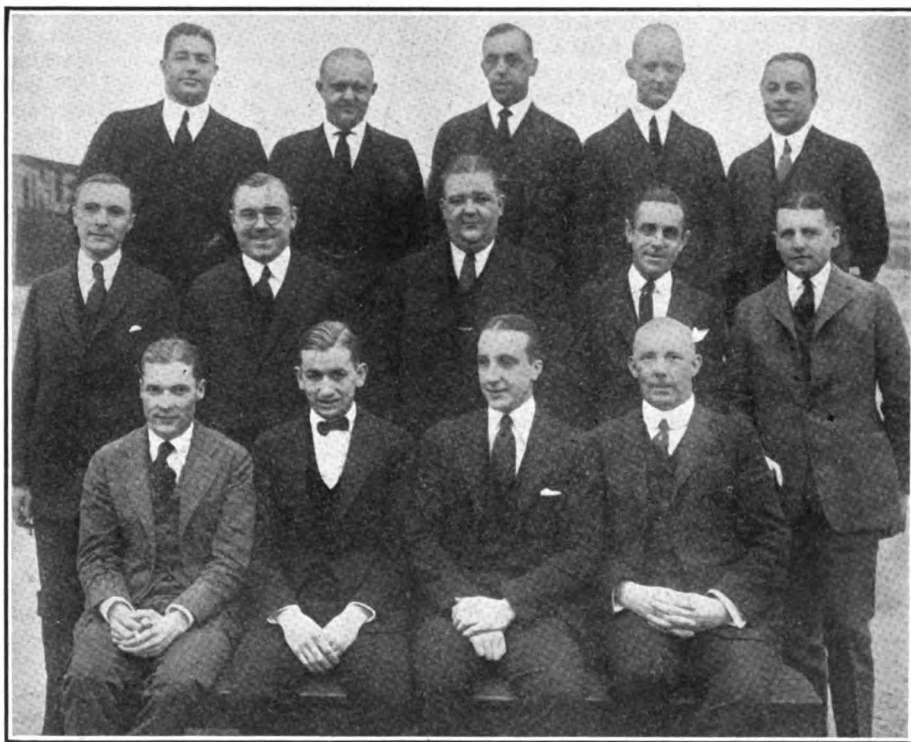
The sales manager from each district in the United States attended and gave

Second row, left to right—C. B. Cook, advertising department; Paul Fay, district sales manager north middle and western states; J. H. Quackenbush, assistant general sales manager; H. S. Greene, south middle western states; B. H. Wolfe, Philadelphia and Pittsburgh district.

Third row, left to right—T. Latimer Ford, assistant secretary and treasurer; D. T. Preyer, district sales manager, Chicago district; C. F. Hockley, president; Walter P. Coghlan, general sales manager; C. A. Gilbert, district sales manager far western district.

## VICTOR GASKETS IN BOXES.

Having in mind the greater conven-



Sales Managers of American Hammered Piston Ring Co. at Recent Sales Conference.

the home office a very clear idea of business conditions in his own particular field. Optimism was the key note.

Each man's idea of selling and of developing his territory was outlined and the exchange of thoughts proved helpful to every one present.

An outstanding feature of the sales conference was the fact that no changes were found necessary in the sales policy of American Hammered Piston Ring Co. notwithstanding the changed economic situation prevailing.

The group photograph reproduced herewith shows the personnel as follows:

Front row, left to right—Joseph S. Jacobs, manager advertising department; W. R. Tupps, manager sales promotion department; T. S. Blakiston, district sales manager, southern district; P. C. Little, district sales manager, New England and New York district.

ience of the trade in the handling of gaskets, the Victor Manufacturing & Gasket Co. is now sending out all cylinder head gaskets packed in heavy fiber boxes. On the end of each box is printed the name of the motor for which the gasket is designed, the gasket number and also the names of all the cars in which that motor is used.

In addition to making the gaskets easier to stock, these boxes protect them from injury until they are used.

Victor Ford gasket assortments are packed in substantial wooden boxes in quantities proportioned to the calls the dealer has for each type of gasket.

An increase of five cents a gallon in the price of gasoline means \$17 to the man who drives his car 5000 miles in the course of a year and who gets 14 miles to the gallon.

## Industrial Outlook Is Brightening

With the opening of the New Year, a brighter outlook in the automobile industry was exemplified by the resuming of activities in a number of prominent Detroit plants and giving employment to some additional 10,000 men. It is stated that still other manufacturers contemplate reopening their plants directly after the close of the New York automobile show.

The Packard plant resumed with a working force of 3000 after having been closed since the middle of December, and additional hands will be put on from day to day as occasion requires.

The Cadillac company started with 1500 hands after a two weeks' shut down, and this, it is stated, points to a resumption of normal production within a comparatively short time.

The Studebaker corporation has opened Plants Nos. 3 and 5 with a force of about 400 at each and a six-day week schedule is also to be again inaugurated.

The Paige-Detroit company has been rehiring hands at the rate of 75 a day, it is announced, and production will be steadily increased during the next two months.

More than 150 men were added to the shop force of the Lincoln Motor Co. the last week of the year and several hundred more were put on the week following.

The officials of the Chalmers company announced that 300 men were engaged to begin work the second week in January, when the making of closed models was to be resumed, to be followed by the starting up of the touring car and roadster divisions at a later period not yet announced.

It was stated that 12 per cent. of the normal working force of 600 were employed at the Columbia Motor Co.'s plant at the opening of the year, but that it was expected that over 200 additional men will be reengaged during the month.

Many employees were recalled Jan. 4 to the plants at Detroit of the Hudson Motor Co., Continental Motors and Scripps-Booth Motors Co.

The Commerce Truck Co. reopened the latter part of the same week with a small force, and the employees of the Saxon Motor Co. have been informed that the plant, now closed, will reopen about Feb. 1.

F. J. Fisher, president of the Fisher Body Corporation, stated that he hopes to add 2000 names to that company's pay roll by the first of next month; about 30 per cent. of the normal force of 10,000 are at work at present.

The Liberty Motor Car Co., which has been operating for some time with a curtailed force, has announced that it will put on several hundred additional hands Jan. 17.

The South Bend plant of the Studebaker corporation has gone on to a schedule of 90 cars a day.

L. G. Brooks of the International Har-

vester Co. stated that his company might put on 500 men at the Milwaukee plant within the first two weeks of the year, which would bring its working force up to the maximum. Mr. Brooks added that if business continued to improve extra hands would be put on. The company usually employs about 4500 men at this plant and 4000 are now at work.

The Chain Belt Co. at Milwaukee rehired 250 hands the first week of the new year.

The Federal Rubber Co., which employs about 2000 hands at its Milwaukee works, was to resume within 10 days from the first of the year.

The Nash Motor Co. at Kenosha was to be reopened within a fortnight.

The Traffic Motor Truck Co., St. Louis, Mo., employing 1500 hands, was to go on full schedule the first of the year.

A canvass indicates that practically all Cleveland automobile makers will go into increased production in January.

The Winton, which had been closed about two weeks, was to reopen Jan. 15.

The White Motor Co. is not working nights, but the entire force of 6500 has been retained on day work, and they are all sure of their jobs through the winter.

Chandler and the Cleveland Automobile Co. slowed down late in the last month of the old year, but are going to stimulate production in January.

Peerless showed operations on a larger basis. The number of employees is to be gradually increased throughout the winter months.

Templar has gradually been increasing its force of employees.

Grant has increased its forces within the last month and it is reported that orders are coming in a volume to indicate a good year's business.

Buick factories at Flint, Mich., resumed operations on a part time schedule on Jan. 10 after a shut down of several weeks.

The Acme Motor Truck plant at Cadillac, Mich., has reopened with about a third of its normal force.



A. R. Johnson, Assistant Sales Manager, Auburn Automobile Co.

## Personal Notes of Industry in Brief

A. R. Johnson has been added to the executive staff of the Auburn Automobile Co., Auburn, Ind., in the capacity of assistant sales manager, supplementing the work of J. I. Farley, vice president in charge of sales. Mr. Johnson was in the selling and advertising departments of the Cadillac Motor Car Co. for three years, subsequent to which he was in the sales department of the Hyatt Roller Bearing Co.

H. F. Greene, who has had 15 years' experience in the automobile industry, has joined the forces of the Apex Motor Corporation, Ypsilanti, Mich., as district sales representative. Mr. Greene started in the automobile business with the Ford Motor Co. in 1905 as a road tester, and later became associated with the E-M-F, Metzger Motor Car, Hudson Motor Car and Dodge Brothers companies in sales service work in the southwest territory. For the last year he has had distribution of the King Eight for three states, with headquarters at Dayton, O. In becoming district sales representative of the Apex, which manufactures the Ace car, Mr. Greene becomes associated with Robert T., "Bob" Walsh and other past associates.

F. T. Newton, Michigan state senator, has been appointed sales director of the Apex Motor Corporation, manufacturer of the Ace car, Ypsilanti, Mich. His connection with the automobile business has covered a long period of years, including five with the Jackson Automobile Co. under T. S. Mathews. Senator Newton was assistant general manager and sales manager of the former Jackson company and left that organization to join the Lewis Spring & Axle Co., with which organization he was connected for three years as sales manager.

Henry Ford, founder of the Ford Motor Co., has, it is reported, acquired property and mineral rights in Marquette county, Mich., valued at \$381,000, according to deeds filed with the county clerk. More than 65,800 acres of land are involved in the transaction and big bodies of iron ore are contained in the tract, which was formerly held by the Michigan Land & Iron Co.

S. C. Mitchell is in charge of a district sales office just established by the Cleveland Tractor Co. at St. Louis, Mo. The territory covered by this branch borders the Mississippi river from Illinois to the Gulf of Mexico, and Mr. Mitchell has become intimately acquainted with the section during his two years' connection as Cietrac sales representative.

W. E. McMains, formerly sales manager for the W. R. Wheeler Co. of Indianapolis, Ind., has joined the organization of the Eclipse Manufacturing Co. in the capacity of director of sales for the tool division featuring the Savidge line of tools. Mr. McMains has also been elected treasurer of the A. C. Savidge Co. of Indianapolis.



## Mason Becomes Sales Manager

The Denman Myers Cord Tire Co., with general offices at Cleveland, O., and factory at Warren, O., has just announced the appointment of C. L. Mason as sales manager.

Mr. Mason was selected by the executive committee of the Denman Myers Co. from a long list of applicants for this important position, being considered particularly qualified from his long and successful experience in the rubber industry. He has held the office of sales manager for one or two of the largest rubber companies in Akron.

Mr. Denman, general manager of the company, also announces that within a very few weeks the factory output will be more than doubled.



C. L. Mason, Who Has Just Been Appointed Sales Manager of the Denman Myers Cord Tire Co.

## TIGER CO. STARTS IN ONTARIO.

The Tiger Tire & Rubber Co., Ltd., which was recently incorporated at \$2,000,000, soon expects to start the manufacture of automobile tires and tubes at Belleville, Ont. H. H. Hastings is general manager of the company.

## GRAND RAPIDS CO. IN PRODUCTION.

It is announced that the Grand Rapids Tire & Rubber Co., Grand Rapids, Mich., has completed the first section of one-third of its plant and will start production of about 200 cord tires daily. The output of the completed plant is expected to reach about 800 a day.

## UNITED STATES RUBBER DIVIDENDS.

The directors of the United States Rubber Co. have declared the regular quarterly dividend of \$2 a share on the common stock and \$2 a share on first preferred. Both are payable Jan. 31 to stockholders of record Jan. 15.

## FIRESTONE SALES FOR YEAR.

The Firestone Tire & Rubber Co., Akron, O., for the year ending Oct. 31, 1920, report sales of \$114,980,969, against \$91,078,514 in the previous year, and profits of \$9,396,912, against \$9,306,978.

## Weston Is President of Ajax Co.

Announcement is made of the election of Joseph C. Weston as president and general manager of the Ajax Rubber Co., Inc., 218-22 West 57th street, New York city, to succeed Horace DeLisser, who has been discharging the duties of the active presidency in addition to those of chairman of the board, of directors. President Weston came to the Ajax company as vice president about a year and a half ago from the United States Rubber Co., with which organization and its subsidiaries he was connected in executive capacities for more than 20 years. Few men are so well known in the tire industry or in the larger automobile field.

Chairman DeLisser stated on the occasion of the company's 15th anniversary that no changes in policy or personnel were suggested in Mr. Weston's election to the presidency.

## FIRESTONE RE-ELECTS OFFICERS.

At its recent annual meeting the Firestone Tire & Rubber Co., Akron, O., re-elected its old board of officers as follows: President, H. S. Firestone; vice presidents, A. C. Miller and Thomas Clements; secretary, S. G. Carkhuff; treasurer, J. G. Robertson.

The directors voted the regularly quarterly dividend on the preferred capital stock, six per cent., payable Jan. 15 to stockholders of record Jan. 1.

Plans for improving plant facilities were made, including the building of an interplant railway system of standard gauge to connect with the steam roads entering Akron.

## ADDITIONAL FUNDS FOR AMERICAN DUNLOP.

The Dunlop Rubber Co. of London, England, has announced that it has assumed the responsibility for providing additional funds to place its American subsidiary in a position to complete construction work on its \$15,000,000 plant at Buffalo, N. Y., and to provide working capital.

The Powerton Tire Corporation has completed its plant at Rochester, N. Y.



Joseph C. Weston, Recently Elected President and General Manager of Ajax Rubber Co.

## Unique Granville Floating Tire

Bernard Granville, a widely known consulting engineer, has invented what is characterized as a trouble proof pneumatic tire, under the trade name of the Granville Floating Tire, which is designed on the unique principle of a rubber treaded steel band protecting the shoe or casing, containing the inner tube. Its construction is claimed to be such as to render it proof against puncture, blow outs, rim cuts, sand blisters and stone bruises. Other advantages are stated to be that there can be no separation of fabric, because the area of flexing of the casing is much greater than in the ordinary pneumatic tire, thus obviating any abrupt bending of the fabric; there is heating because the heat generated by road friction is radiated through the edges of the steel band, which are exposed to the air as the tire revolves and act as a fan, keeping the



Granville Floating Tire.

casing and tube always cool and that its floating principle keeps the travel of the axle in the same plane regardless of inequalities of road surface, because the movement of the shoe is from the inside outward instead of from outside inwards.

The Granville floating tire is the result of six years of experimentation and has been tested for several years, it is stated, by the most trying tests on the road. It is constructed with beads of standard size and shape and is made in all sizes adopted by the United States standardization board.

It is being offered by the Granville Tire Co., 1926 Broadway, New York city, recently incorporated with an authorized capital of \$15,000,000, and the

officers and directors are as follows:

President, Bernard Granville; vice president and treasurer, A. Roszkowski, vice president of the Polish American Navigation Corporation of Delaware; secretary, John C. Boice, vice president and general manager of the Vesta Storage Battery Co., New York city. Additional directors: L. S. Berg, president of the Societe Industrielle du Caoutchouc of France; Fred D. Blauvelt, vice president and treasurer of the F. N. DuBois Co., Inc.; W. M. Leise, banker, of Marshalltown, Ia.

### HARVEY HEADS INDIA'S NEW EXPORT DEPARTMENT.

The export business of the India Tire & Rubber Co. of Akron is stated to have reached such proportions as to necessitate the establishment of an export department, and it is in charge of Lynn Harvey of Akron. Mr. Harvey brings to his new duties the experience of a good many years spent in the export business. He was formerly assistant export manager for the Miller Rubber Co. of Akron, with which organization he was connected for three years. For six years previous to that he was with the H. K. Porter Co., Pittsburgh's well known locomotive manufacturers.

Mr. Harvey returned about two months ago from a year's trip abroad in the interests of the Miller Co. He covered Australia, Tasmania, New Zealand and Hawaii, and reports business very good.

### GOODRICH ENGINEERING DIVISION.

The engineering department of the B. F. Goodrich Rubber Co., Akron, O., has been reorganized under the supervision of S. B. Robertson, who recently succeeded George Perks as director of engineering. B. H. Clingerman, formerly managing power engineer, now holds the position of consulting engineer for the company. Mr. Clingerman has been with Goodrich for over two years. Other changes in the engineering personnel are as follows: J. H. Vance, former superintendent of power, becomes power engineer. W. C. Hoover is the designing engineer, B. C. Mitchell, the structural engineer; E. D. Barry, material engineer; V. A. Parker, molding engineer, and W. F. Pierce, master mechanic. E. F. Myers and F. E. Blower are assistant master mechanics and W. P. Sheely chief inspector.



New Syra-Cord Ford Tire.

### NEW SYRA-CORD FORD TIRE.

The Syracuse Rubber Co., Inc., Syracuse, N. Y., announces the addition to its line of Syra-Cord tires a size for the Ford car in which it is claimed that a new method of making beads is utilized which eliminates the common trouble of rim jumping. Exhaustive factory tests of these tires have been substantiated by trials by private owners.

### CRUDE RUBBER EXPORTS FROM BRAZIL.

Total shipments of crude rubber from Brazil and from Iquitos, Peru, during November, 1920, amounted to 3,148,442 pounds, Europe receiving 1,689,606 pounds and the United States 1,458,836 pounds, compared with total exports of 7,676,442 pounds in November, 1919.

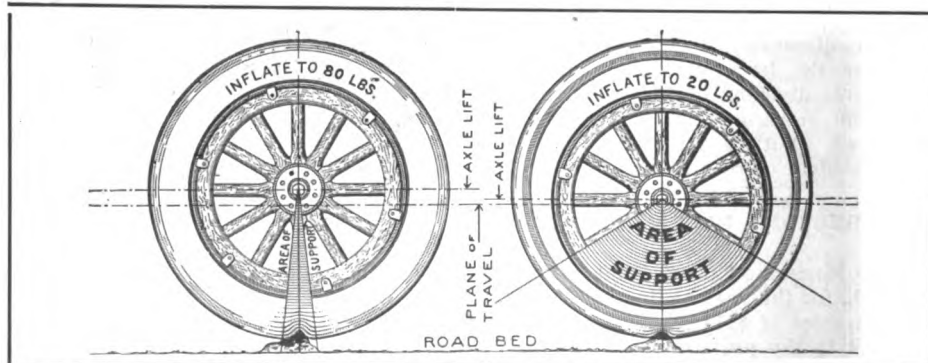
### HOOD RUBBER DIVIDEND.

The directors of the Hood Tire Co., Watertown, Mass., have declared a dividend of \$1 a share on the new common stock, which was payable Dec. 31. This is at the rate of \$4 a year, equal to \$8 on the old stock.

### MILLER CUTS TIRE PRICES.

The Charles E. Miller Rubber Works, Anderson, Ind., has cut down the prices of cord tires 15 per cent., and the reduction also includes tire moulds, cores, vulcanizing equipment for tire and rubber repair shops, rubber workers' tools, etc.

In order to conserve the cash resources the directors of the McGraw Tire & Rubber Co., at a recent meeting in Cleveland, O., voted to pass the usual quarterly dividend on preferred stock.



Sketches Showing Comparison Between Granville Floating Tire and Ordinary Type.

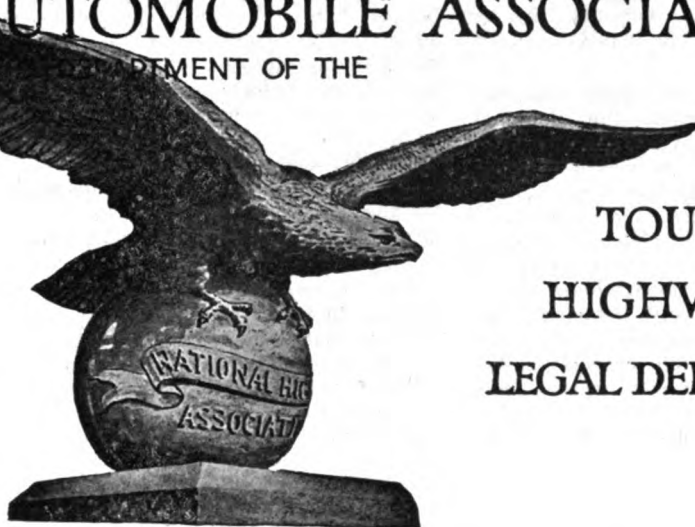


# OFFICIAL JOURNAL OF THE NATIONAL AUTOMOBILE ASSOCIATION

DEPARTMENT OF THE

NATIONAL  
HIGHWAYS  
ASSOCIATION

TOURING  
HIGHWAY  
LEGAL DEPTS.



9 PARK STREET, BOSTON, MASSACHUSETTS

## *Protest Against Increase of Registration Fees*

**I**N ADDITION to the federal provision set forth in the December Automobile Journal, the various states are getting into line and Massachusetts is coming forward with a bill to increase registration fees to practically double their former rate, the argument in their favor offered by the legislators being, "We need the money and the automobilist is the easiest man to get at without hurting the majority of our constituency."

The proponents of this increased motor registration fee claim that it is due to the fact that motorists are the most extensive users of the highways and, therefore, they should bear the burden of highway costs. Heretofore the commonwealth and its various subdivisions have been able to get a considerable income from taxes levied upon street railways, but this method has been worked to a "fare-thee-well," the final result apparently being that the majority of the suburban and country street railway lines have either been discontinued or put into the hands of receivers. The particular theory upon which they were taxed was that they had a special privilege and right upon the highways of the state and that they caused a considerable amount of damage to the said highways and, therefore, ought to be made to pay.

It is to be wondered whether or not excessive taxation on cars may cause the loss or partial loss of this method of transportation by making it so expensive that the average man cannot afford it.

One theory is that a tax on the automobilist can be made to appear as a burden imposed alone upon the wealthy or well-to-do and at no cost to the so-called common people. But it should be

remembered that the automobile is not today exclusively a pleasure vehicle. Even the so-called pleasure car is used extensively for business purposes, and increased taxation on this method of transportation is only another way of imposing an indirect tax upon the average citizen, for whose rights the legislators are always so solicitous.

In the old days before the automobile was known the owners of teams, either for pleasure riding or for business purposes, did not constitute so large a percentage of the population as does the automobile owning class today and yet, in those days, no one thought of imposing a special tax upon the owners of horse drawn vehicles, or that they should be compelled to pay for the entire cost of constructing the highways, leaving to the average citizen only the cost of constructing sidewalks. There would seem to be no more logical reason today why the automobilist should be expect-

ed to pay this entire highway cost.

The highways are built, not for the use of the automobilist alone, but for the purpose of communication between peoples of all parts of the state and of the country, and they are equally for the benefit of those who do not own motor vehicles and those who do own them for, without proper and safe means of intercommunication, the dweller in the countryside or in the city is going to suffer whether he owns a motor vehicle or not and he must expect that he will have to pay his share of the cost. It is not going to lighten the burden any to have to pay it indirectly; for the cost of the registration of every motor vehicle, whether truck or passenger car used in business of any kind is going to be charged up to the expense of doing business and added to the cost to the ultimate consumer.

Before the advent of the automobile it was considered sufficient to tax the own-

### APPLICATION BLANK

BLUE  
BOOK

NATIONAL AUTOMOBILE ASSOCIATION  
New England Department  
NATIONAL HIGHWAYS ASSOCIATION  
9 PARK STREET, BOSTON, MASS.

The undersigned hereby applies for membership in the National Automobile Association, New England Department of the National Highways Association.

Enclosed herewith you will find check for \$7.00.

If you wish the Blue Book sent to your address, add 15 cents to the Membership Fee for packing, insurance and postage.

Name..... Telephone.....

Address..... City..... State.....

Make of Car.....

Checks MUST be made payable to the National Automobile Association.

er of a horse or of a horse drawn vehicle the full value of his equipment, as a personal property tax. Not only is this done to the automobilist today, but he must also pay a high registration fee. If the fee becomes more than nominal, then he is the victim of double taxation, which is a gross injustice.

If registration fees are to be increased in Massachusetts, then the personal property tax on automobiles should be abolished. The bill proposed to the Massachusetts legislature for 1921 is open to objection by every motorist throughout the state. It has been suggested that the increase in registration fees proposed by this bill is so great that it is probably offered with the idea of affording a basis of some compromise, but the National Automobile association believes that every motorist should not only oppose the bill itself, but should refuse a compromise and should insist that the legislature refuse to grant any increase whatsoever this year.

The association strongly urges every reader of this article that, if he is not already a member of some motor organization, he join one at once so that the strength of a united motoring public may be brought to bear upon the legislature in opposition to this bill.

#### BENEFITS DERIVED FROM MEMBERSHIP IN THE N. A. A.

Many people have asked this question, "Why should I join the N. A. A.?" In answer to this query the officials of the association say that there are two main benefits to be derived from membership.

First, direct benefits such as complete Blue Book touring information through-

out the United States and insurance against the necessity of employing expensive counsel, if through any chance the member should be charged with the violation of any automobile law or regulation. The cost of such insurance is so small that it would seem hardly possible that any motorist would not wish to have it, particularly in these days when so many cars are on the roads and when, as is too often the case, on the pretense of making the roads safe, traps are laid by police officers in some communities for the express purpose of catching the unwary in a merely technical violation of the law.

The National Automobile association believes in indorsing every policy which tends to make the highways of the state and of the country safe for everybody, pedestrians, as well as motorists, but there are today so many and so varied regulations, both laws of the state and by-laws of cities and towns, that it is practically impossible for any motorist to drive 50 miles without at least technically breaking some law or regulation and oftentimes the most careful and conscientious driver is summoned into court for an offense of this kind, when the cost of counsel would far exceed the cost of membership in this association.

But far and above the direct benefits are the indirect benefits from membership. Each individual motorist cannot appear before the legislature whenever bills injurious to the motorist are up for consideration. This association, through its counsel, represents the motorists of New England on these matters and, by joining the association, you protect yourself against hostile legislation and aid every other motorist in the same way.

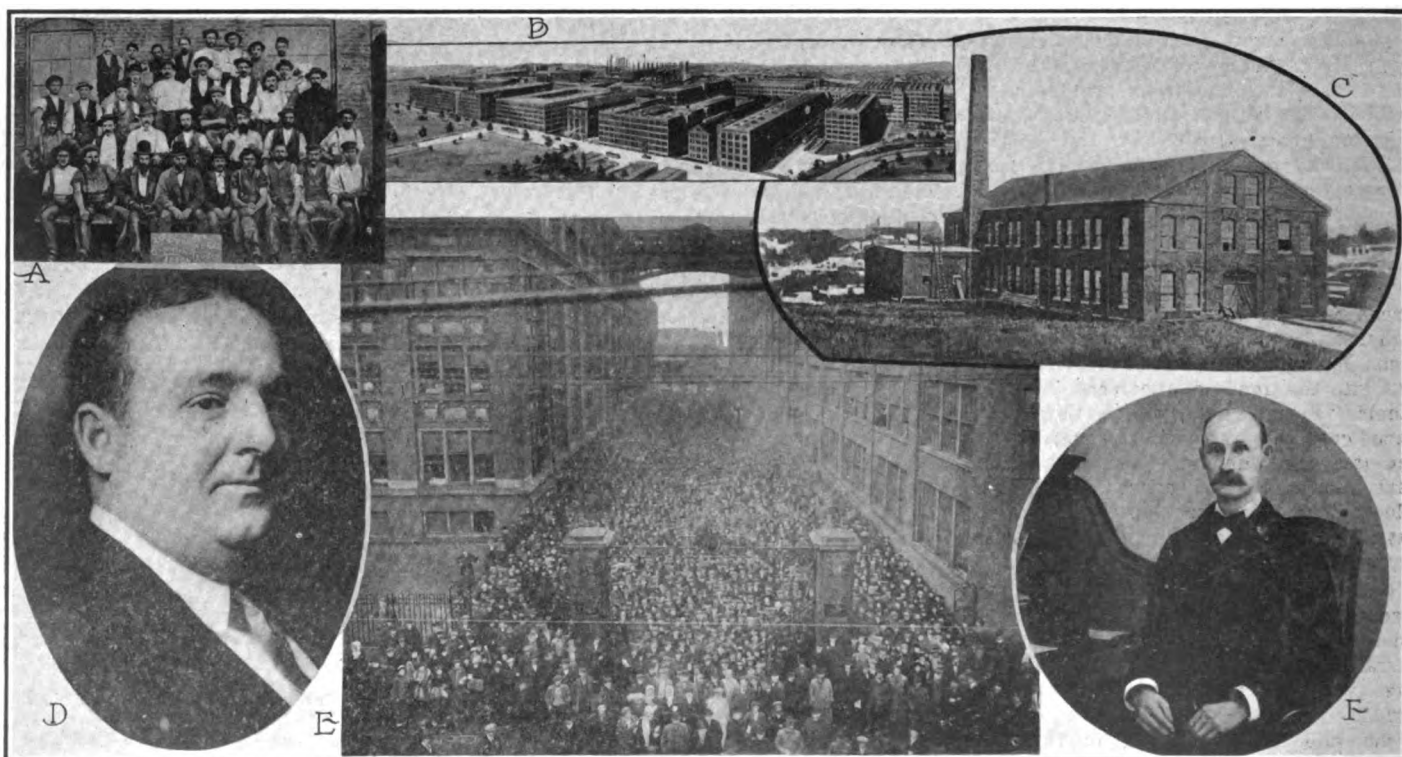
#### GOLDEN ANNIVERSARY OF THE B. F. GOODRICH RUBBER CO.

Fifty years ago, Dec. 31, 1870, saw the incorporation of the B. F. Goodrich Rubber Co., Akron, O., the pioneer rubber factory of the Rubber City. The founder, Dr. B. F. Goodrich, was a physician by profession, and became interested in the industry by having acquired a small rubber factory at Hastings-on-the-Hudson, N. Y., in a real estate deal.

As a result of a quest for financial help he finally went to Akron and located in a small two-story brick building with a force of 25 employees. This little factory of 50 years ago has grown until today it comprises 63 buildings of brick and steel, covering 110 acres of ground.

The first product Goodrich ever made was fire hose. Article after article was then added to its list of manufactured goods until today approximately 30,000 rubber products are made. The next step in its growth came with the development of the bicycle, for which Goodrich designed and manufactured pneumatic tires. Before this period, however, the company had taken the initial step in the evolution of rubber shod wheels by perfecting the solid rubber tire for carriages. The success of this tire, followed by that of the pneumatic tire for bicycles, naturally led to consideration being given for tires for automobiles.

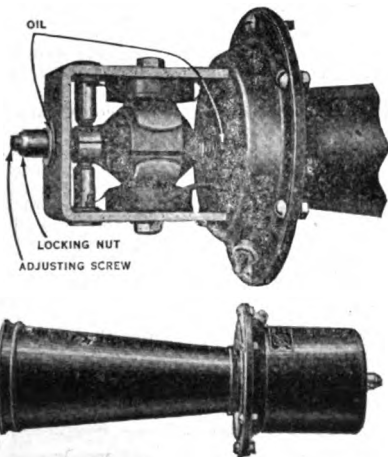
The Goodrich company is commemorating the anniversary by publishing a 48-page booklet called the "Golden Year of Goodrich," telling of the romance of the rubber industry, its history, and of what importance it has been in the progress and development of the world. The book was written by Wilbur D. Nesbit.



Golden Anniversary of B. F. Goodrich Rubber Co., Akron, O.: A—Goodrich Factory Force in 1870; B—Bird's-Eye View of Plant, 1920; C—First Goodrich Building, 1870; D—B. G. Work, President of B. F. Goodrich Co.; E—Employees Leaving Plant in 1920; F—Dr. B. F. Goodrich, Founder of B. F. Goodrich Rubber Co.

# ACCESSORIES DEPARTMENT

**The North East Horn**, an electric motor driven component, designed with special reference to reliability of operation and effectiveness of warning power, is now offered to the retail trade, having been available for some time to car manufacturers exclusively. Claim is made that



the horn is designed and constructed in keeping with the best manufacturing principles and will stand up under the most exacting tests. The motor, small and compact, is very powerful, and the construction of the armature prevents stopping on dead center. In other words, there is no danger that the horn will "go dead" at critical times.

The real distinguishing feature of the horn, however, is said to be its tone. Commanding, yet courteous, it gets attention without giving offense, and in spite of its volume and carrying power is very pleasing.

It is understood that jobbers and dealers throughout the country have taken over the sale of the article with every evidence of a large future business.

Manufactured by the North East Electric Co., Rochester, N. Y. Retail price, complete with bracket, push button and wire, \$16.

**The Cloud Piston Ring for Ford Cars**, as shown in the accompanying illustration, has a double-step cut joint which causes it to fit perfectly and prevents any



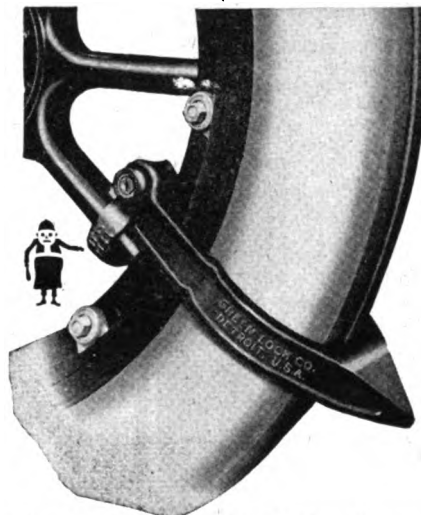
leakage. The outside of the ring has a specially developed surface, consisting of a series of exceedingly small ridges, the action of which on the smooth cylinder walls causes the ring to become seated more readily than some other types ac-

(When Writing to Advertisers, Please Mention the Automobile Journal.)

ording to the manufacturers. Claim is made that the ring has many high class features not usually found on popular priced rings.

Manufactured by Cloud Accessories Corporation, 1408 South Wabash Avenue, Chicago, Ill. Price, 75 cents.

**The Stop Thief Car Lock**, as the cut shows, has an improved "spoke grip," which makes it impossible for the thief to change its position and drive off with the car. It is highly spoken of by those who have used it, and the "non-pickable lock," with which it is supplied, makes it practically thief proof. It is made of the best steel and is painted a bright green and can be applied in a moment without tools of any sort. The manufacturer has a standing offer of \$100 reward for any car so equipped that is



stolen. This lock, while designed principally for stopping the theft of cars, can also be used to hold the spare tire and, in addition, makes a very effective "sprag" or cleat for getting a stalled car out of mud or snow.

Manufactured by the Green Lock Co., Detroit, Mich. Priced from \$7.50 to \$12.50.

**The Gemco Tri-Chek** consists of a strong spiral spring which attaches to



the front of a Ford car between the radiator and the center of the front axle. Claim is made that this device, formerly known as the Clark Equalizer Spring, ef-

fectually keeps the entire frame of the car from rocking. The Tri-Chek is said to be especially suited for heavy Ford trucks and delivery cars where the weight of a heavy load is often unequally distributed.

Manufactured by Gemco Manufacturing Co., Milwaukee, Wis. Retail price, \$5.30.

**The Broughton Steel Blow-Out Boots** are used on tires to strengthen weak spots or blow-outs, and by the use of several at a time they are claimed to prevent the car from skidding.

Steel blow-out boots are designed only for clincher tires and fasten under the clincher edge of the rim. They are made entirely of metal, presenting a smooth surface to the road, while provision is made in the side members for adjusting the boot to different sized tires. Placed close together they form a protection for



a blow-out, enabling the motorist to drive the car, even when a bad blow-out has occurred.

Manufactured by George H. Broughton Co., 256 Michigan Avenue, Buffalo, N. Y. Prices on request.

**Flexible Carbon Scraper.** This is a set of three tools for the garage or service station repairer, each composed of six oil-tempered, spring-steel wires firmly secured in a handle, and shaped and sharpened so as to easily reach all parts of the combustion chamber, the manufacturer states. It removes the carbon accumulation without dismantling the engine. The large number of scraping fingers not only



adds to the flexibility of the tool, but also permits them to conform to the surface and to clean a path its entire width.

Manufactured by the Flexible Carbon Scraper Co., 1421 West Washington Street, Los Angeles, Cal. Prices on request.

# TURBINE AUTOMOBILE WASHING MACHINE

SAVES  
TIME

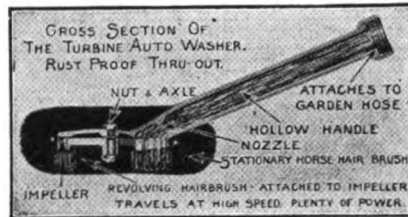


SAVES  
LABOR

GETS IN-GETS THE DIRT-GETS IT QUICK-EFFICIENT TO USE

The Turbine Auto Washer is said to make the washing of automobiles an easy matter. It combines a soft brush and a hose in one unit, and claim is made that a quick wash with the turbine and a rub with the chamols is all that is needed to insure a clean car. The manufacturer claims to be meeting an unusual demand for the washer with the advent of cold weather, and ambitious sales plans seem to point to a universal distribution throughout the country.

Manufactured by Turbine Auto Washer Co., Three Rivers, Mich. Retail price, \$5.



The Luxury Shock Absorbers for Ford Cars consists of two coiled springs parallel with each other, supported in a vertical position by means of a special perch which is fastened to the brake drum disc. Special shackles are supplied which join the end of the spring to the absorber, which allow the coiled springs to carry the weight of the car body and its load independent of the axle. It is stated that

The Wayne Super-Visible Gasoline Pump, which has recently been placed on the market, is said to possess many distinctly new features of design and operation. The gasoline is contained in two glass receptacles correctly marked, and the customer and dealer are assured of exact measure by the operation of the Wayne Five-Way valve, which effectively prevents the return of any gasoline to

diameter, 20 1/4 inches base diameter and nine feet seven inches in height. It is constructed of brass, sheet steel, heavy cast iron and black iron, and the valves are brass, carefully machined and ground to fit. The pump delivers five gallons with 15 strokes, and has a capacity of 20 gallons a minute.

Manufactured by the Wayne Oil Tank Co., Fort Wayne, Ind. Printed matter containing more specific details may be had by addressing the manufacturer.

The Chauffeurs' Universal Wrench is self-adjusting for any size square or hexagon nut up to 1/2 inches and will hold round pipe up to 1/2 inch. The jaws are opened by pressing the trigger, and automatically closed by means of a spring. It will firmly grip any size piece within its

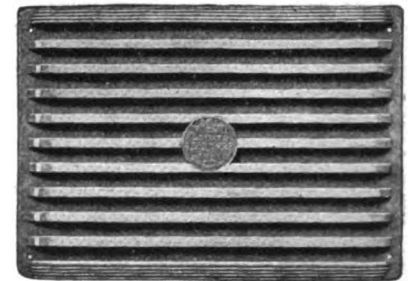


capacity, according to claim made by the manufacturer, and the entire tool is strongly made from steel with hardened jaws. The handle is especially shaped to give a good grip. The length over all is seven inches and the net weight is eight ounces.

Manufactured by Goodell-Pratt Co., Greenfield, Mass. Price, \$2.50.

The Stanwood Safety Step Plates are manufactured exclusively for the automobile trade and embody several features that recommend them to discriminating buyers. The base of the plate is metal, while the corrugated rubber surface is vulcanized to the metal base, making a step plate which the manufacturer claims cannot buckle or warp.

Rubber, exposed to the weather, warps and stretches, and especially so when sub-



jected to such treatment that a step plate ordinarily receives. Tests have proved that rubber used in the form of matting for a step plate buckles between the fasteners that hold it to the running board, soon rendering it useless.

The metal rubber cover is an exclusive feature of Stanwood Safety Step plates and is fully protected by patents.

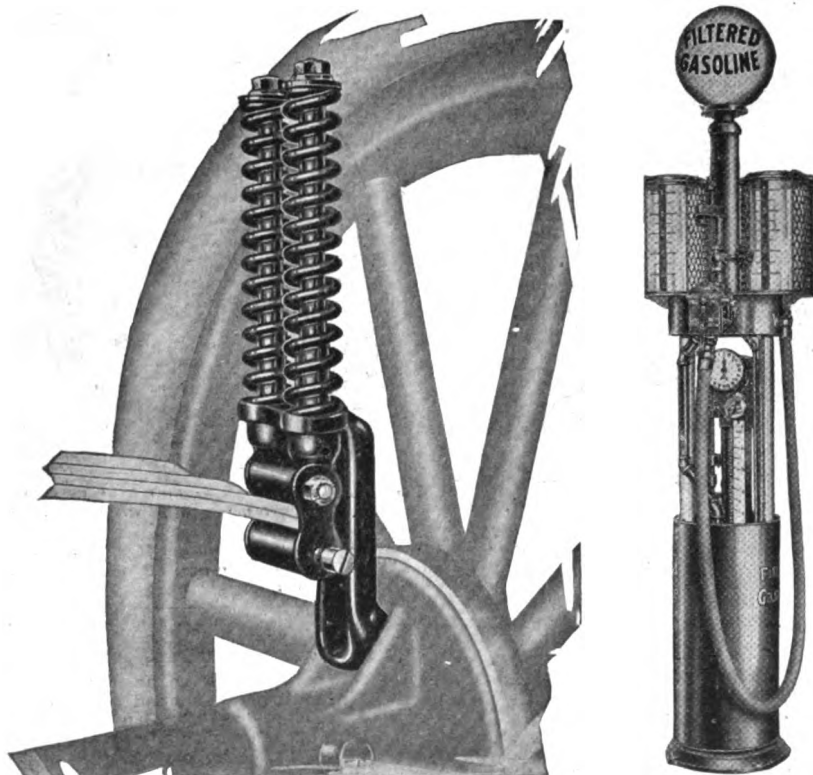
Manufactured by the Stanwood Equipment Co., 308 North Michigan boulevard, Chicago, Ill. Prices and literature on request.

The Autoquip Valve Grinder is a device by which a simple gear and rack mechanical movement performs a 1/2 reciprocating motion, operated by the continuous turning of a crank, and claim is made that anyone can successfully use it. It has no parts to get out of order, is sub-



stantially made and is guaranteed to last a life time. The manufacturer announces that many of these grinders have been sold to individual owners as well as to garage men.

Manufactured by Autoquip Manufacturing Co., Inc., Rochester, N. Y. Price, \$5.



the Luxury shock absorber greatly improves the riding qualities of a Ford passenger car and prevents the nuts from loosening on the various parts of the chassis.

All parts of the Luxury shock absorber are made of the best of materials obtainable, and it can be easily fitted on to the car by the motorist in a few minutes time without drilling additional holes.

Manufactured by the Specialty Device Co., Cincinnati, O. Prices and literature on request.

the underground tank. The pump employs no motor, thus eliminating all danger of fire, and general economy of operation is gained by an exclusive device which automatically fills one container as the other empties. Greater efficiency is obtained by an exclusive filtering device which delivers the fuel free from air and sediment, and the danger of loss of gasoline by spilling is minimized by the shut-off valve, which may be operated instantly.

The model shown is 28 1/2 inches top  
(When Writing to Advertisers, Please Mention the Automobile Journal.)



The C-H Charging Rheostat, shown in the illustration, is said to stand up exceptionally well, even under severe conditions, and is easily installed and operated.

The name plate bears the directions for charging. The rheostat is connected in one of the lines from the 32-volt generating set and in series with the battery to be charged. A dial plate underneath the operating handle is marked to indicate the proper setting for charging certain numbers of cells. The handle is moved until the arrow is at the proper point on the dial plate, after which the battery



circuit is closed and the charge begins. An ammeter to measure the charging current is not necessary, as the current will be of the proper value (approximately five amperes) when the handle is in the right position as indicated on the dial. The dial may be provided with marks for batteries consisting of three, six, nine and 12 cells.

Manufactured by the Cutter-Hammer Manufacturing Co., Milwaukee, Wis.

The Staggard One-Piece Ball Bearing Thrust Washer is designed to eliminate Ford and Chevrolet rear end troubles, stop noise and grinding, and generally make for more efficient power transmission. The most vital part of small car mechanism, the rear axle, is frequently run on thrust washers of plain babbitt.



Babbitt when run with steel bearings will frequently cause gears to wear quickly, it is claimed, and the invention is said to correct this trouble in great measure. It is stated that the washer is made with 13/64 inch beat Hoover steel balls set in 3/32 inch solid cast white brass or bronze plate, and is the exact size to replace the regular babbitt washer without change.

Manufactured by the Pittsburgh Casting and Heater Co., Pittsburgh, Pa. Price, bronze, \$2; white brass, \$1.50.

The Nacto Cleaning Products include such well known articles as Nacto spot remover and cleaner, Nacto carbon remover and Nacto tar remover. Each article is especially compounded for the purpose for which it is named and is stated to be excellent for that purpose.

The Perfect cleaner and spot remover is claimed to easily remove oil, grease, tar, paint, varnish, chewing gum, candle

grease, etc., from cloth and fabrics without damage or injury to them.

Nacto carbon remover is stated to remove all carbon from the combustion chambers of the internal combustion en-

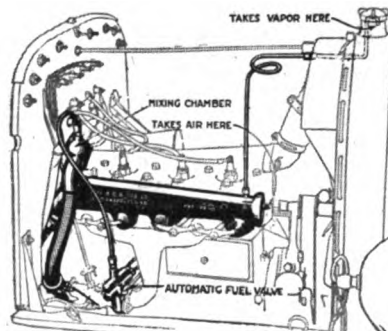


gine, and is guaranteed not to injure the metal, or to impair the lubricating oil, as it will not mix with or dilute engine oil.

Nacto tar remover is a positive solvent for tar and oil and is guaranteed to remove all tar or road oil from the finished surfaces of the automobile without injury to the paint or varnish.

Manufactured by the Nacto Cleaner Corporation, Madison Avenue, corner 136th Street, New York City. Prices and literature on request.

The Ideal Vaporator for Ford Cars and Trucks is offered to the public with a written guarantee that its use will save 50 per cent. of the fuel used. The claim is made that the use of the device will give more than 30 miles to the gallon, made possible by a unique principle which

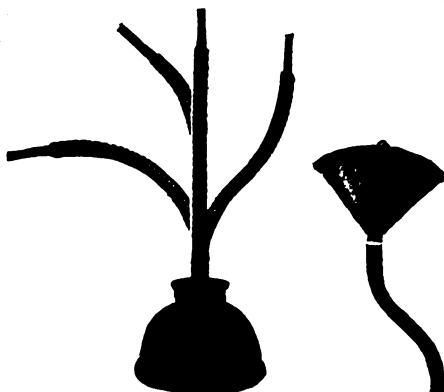


introduces preheated moisture and air with a small amount of gasoline into the combustion chamber in such a manner as to produce a highly combustible fuel.

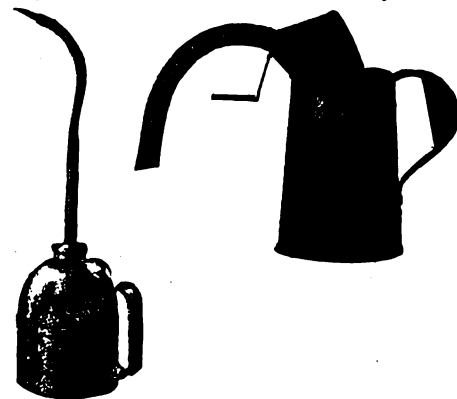
Exclusive agencies are being established and a great amount of missionary work is being carried on in various territories.

Manufactured by the H-O-B Manufacturing Co., Indianapolis, Ind. Price, \$25.

The Flex-Spout Oilers, Tunnels and Filling Cans are of special interest to the service station and garage trade, as they fill a long felt want. Flexible spouts are attached to the various devices offered by



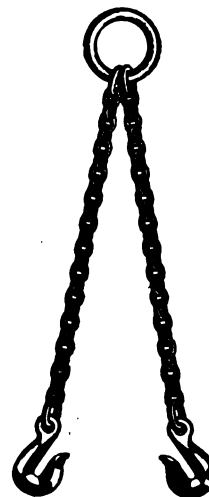
this manufacturer which makes them unusually convenient for applying oil to the crankcase, oiling hard-to-reach places about the car and the many small openings where oil is used exclusively. The



various devices to which flexible spouts are attached are made of steel heavily coppered, while the spouts themselves are made of the same material and are guaranteed not to break, loosen or leak even if stepped on, and when flexed the manufacturer states will stay flexed until straightened again.

Manufactured by J. M. Dickson, 30 Church Street, New York. Prices and literature on request.

The Acco Automobile Sling Chain is designed for service in the garage and repair shop for the lifting of motors and transmissions from the chassis, raising the front or rear end when replacing springs or removing axles and many other odd jobs of heavy lifting where absolute safety is the first essential. These sling chains, used in connection with a block and tackle, or a portable crane, make a complete hoisting outfit that will save many hours of labor and prevent accidents, as they do not easily wear out or get cut as does the ordinary rope equipment. They may also be used for gen-



eral utility work such as emergency towing or binding chains, etc.

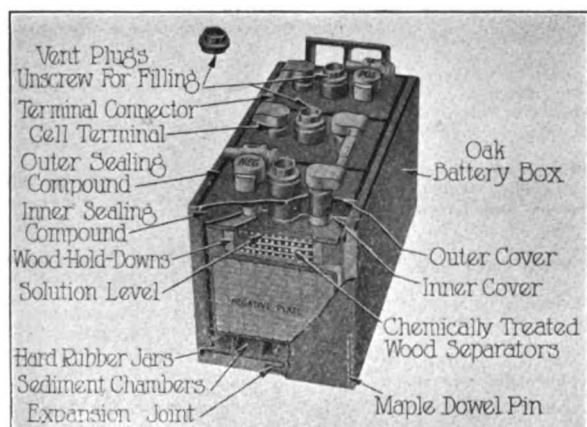
They are made in two sizes: One 5/16 inch tested for a safe working load of 1300 pounds; length of each branch, 9 2/3 feet over all; weight, 21 pounds; designed for the largest and heaviest motors. And the other 1/4 inch, tested for a safe working load of 750 pounds, for medium sized motors, such as the Ford, Dodge, Maxwell, Reo, etc.; length of each branch is 5 1/4 feet over all and the weight, 8 1/2 pounds. The material is proof tested welded coil chain with a ring on one end and a grab hook on each free end. The finish is self-colored. Each outfit is packed in a strong canvas bag.

Manufactured by the American Chain Co., Inc., Bridgeport, Conn. List price, 1/4 inch size, \$3 each; 5/16 inch size, \$6.50 each.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

## CARE AND MAINTENANCE OF THE BATTERY

**T**HE storage battery on the motor car may be considered the heart of the electrical system. Its functions may be compared to that of a storage tank or reservoir in the typical water works system of the modern small town. The re-



**Typical Storage Battery, Components Clearly Indicated.**

servoir corresponds to the storage battery, the pump to the generator and the water mains to the wiring of the car. When the generator produces more current than is consumed by the ignition, lamps or other electrical accessories, the surplus current passes through the battery, causing it to take on an electrical charge; that is, to store up energy, as ordinarily understood. When the engine is at a standstill and the generator is not running, or if the engine is not driving the generator fast enough to produce the required amount of current, the battery supply may be drawn upon for cranking the engine, operating the lights, supplying ignition, operating the horn, or performing any other service for which the electrical system may be designed.

The cause of most battery troubles is due to improper care of the battery and misuse of the electrical equipment, chiefly because the principles involved are not understood.

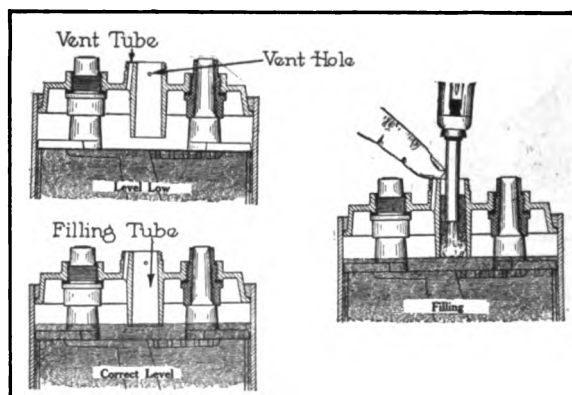
### Composition of Storage Batteries.

Storage batteries for automobile use are composed of rubber jars, lead plates, plate separators and electrolyte. The plates are composed of lead cast into grids with a composition of lead oxide pasted into them. This composition is called the active material, and sets hard similar to cement when dry, remaining so throughout the

life of the battery. The plates are then placed in the electrolyte and a current of electricity passed through them, converting the positive plates to lead peroxide and the negative plates to spongy lead. In battery use discharge causes lead sulphate to accumulate on the plates so that they may be completely insulated from electrolytic action if long continued; charging reduces the sulphation and restores the plates to activity. Excessive sulphation is destructive of the plates. Discharge should be as slow as possible and, for lighting and starting service, battery voltage should never be less than what will be indicated by a specific gravity of 1.200.

The jars are made of either rubber or glass to prevent the acid from acting upon them. A cell comprises a jar with plates and electrolyte. The voltage of a cell is about 2.2, regardless of the size or number of plates in it. A three-cell battery consists of three cells connected in series, and has a voltage of approximately 6.6. The plates do not extend to the bottom of the jar, a space being left for sediment that will accumulate as the battery is used.

Plate separators are made of either wood or hard rubber, and are used to keep the plates of opposite polarity apart, also to prevent foreign substances from forming short circuits in the cells. The plates are placed alternately in the cells, a positive and then a negative, all of the positive plates being connected in parallel, as



**Testing the Electrolyte.**

well as the negative. To distinguish the positive from the negative plates it is merely necessary to remember that there is one more negative plate than positive, also that the color of the positive

### FINDING BATTERY SPECIFIC GRAVITY.

plates is reddish brown while that of the negative is a dark gray. The capacity of the battery, in ampere-hours, depends upon the size of the plates.

The electrolyte is made by mixing pure sulphuric acid with water in definite proportions. The specific gravity of water is 1.000 and that of pure sulphuric acid about 1.840. If two parts of acid were mixed with five parts of water the resulting electrolyte would be about 1.300 gravity. The acid should be added to the water when the electrolyte is being made, and not the water added to the acid. The specific gravity of an electrolyte should be taken when it is cool. Pure distilled water should be used in a storage battery.

#### Finding the True Gravity of a Battery.

The true gravity of the solution in a storage battery can only be ascertained by charging the battery until the gravity ceases to rise for a period of at least two hours. When a battery is being charged the gravity continues to rise until it is fully charged. As a battery is discharged its gravity falls.

A fully discharged battery will test about 1.150. A battery should not be used when the gravity is this low, but should be charged at once. If the gravity of the battery is low, distilled water should be added until the plates are covered from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch, and the battery given a charge from an outside source. It should be charged until the gravity ceases to rise for two hours. The reading should then be between 1.275 and 1.300.

A battery may be practically discharged and still test 1.300 if it has been "doped" (too much acid added). To determine the actual working condition, allow the battery to discharge at, say, 100 amperes and measure the voltage of each cell while discharging. If this voltage falls below 1.6 the cell is defective or nearly discharged.

#### Rate of Charging the Battery.

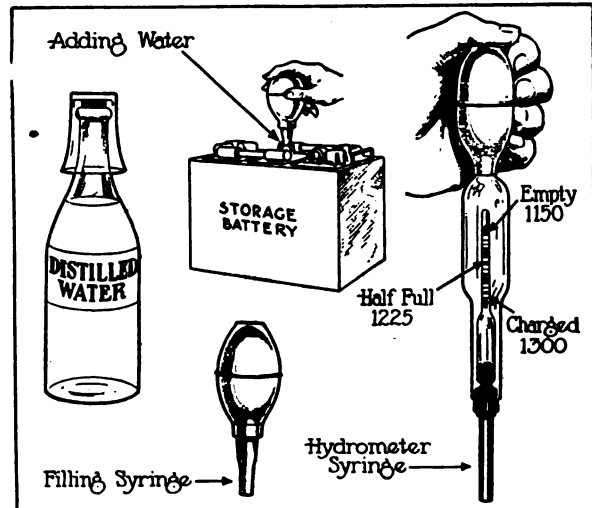
The charging rate depends upon the size of the battery and state of charge. If the gravity of a battery is below 1.150, or over 1.250, it should be charged at about five per cent. of the rated capacity; that is, a 100 ampere-hour battery should be charged at five amperes. If the gravity of the battery is between 1.150 and 1.250, it should be charged at 10 per cent. of the rated capacity, or in case of a 100 ampere-hour battery, under the same conditions, it should be charged at a 14-ampere rate.

#### Adding New Electrolyte.

Pure acid or new electrolyte should never be added when a battery is in a discharged condition. The gravity of a battery being low is not a

sure sign that it needs new electrolyte, as it may be in a discharged condition. The cells should be filled to the proper height with water and the battery charged until the gravity ceases to rise for two hours. If the gravity fails to rise to 1.275, some of the solution may be taken out and replaced with new 1.300 electrolyte.

The voltage of a cell, while charging and nearing a fully charged condition, will rise to approximately 2.5 volts when charging ceases. When a storage battery is being charged energy is being stored up in it in a chemical form. This energy is returned in an electrical form when the battery is discharged. When two parts of sulphuric acid are mixed with five parts of water the gravity of



Equipment Necessary to Test Electrolyte and Supply Distilled Water.

the solution would be 1.240 if there were no evaporation. Enough water evaporates, however, to make the gravity of the solution 1.300 when cooled. Acid does not evaporate. Adding electrolyte to replace evaporation is wrong for if this is done the battery may have a gravity of 1.300 when not fully charged. To make sure of the true gravity, the battery should be kept on charge until the gravity ceases to rise for two hours, and the true gravity of the battery will then be obtained.

#### Adding Water.

Pure, distilled water should be added to a battery when in use at least twice a month. In cold weather water should never be added to a battery and allowed to stand in a cold place, unless it has been given a charge after the water was added. Water is lighter than electrolyte and will remain on top and freeze if not mixed with the electrolyte.

### CLEANING SEDIMENT FROM CELLS.

#### Terminals of the Battery.

The terminals of a battery should be kept tight and free from corrosion. If the terminals begin to corrode the foreign matter should be removed at once. Take all bolts, nuts, washers and straps that can be removed readily and clean them by placing in a strong solution of cooking soda and letting them stand for a half hour. Then use a short, stiff brush to remove all signs of corrosion. Also clean the terminal posts of the battery, being careful not to let the soda solution get into the battery. Wipe all parts dry and give them a good coat of vaseline. When assembling wipe the vaseline off contact surface so that good contact is made. After all parts are assembled they

short circuit across the bottom end of the plates it will cause the battery to overheat, gas excessively, the gravity will be slow to rise and when the charging current is switched off the voltage of each cell will drop below 2.2 and will continue to drop. The gravity of the solution will also continue to fall and in time the battery will be discharged even if not in use.

To remove the sediment fill each cell with pure distilled water to the proper height and place the battery on charge until the gravity of all the cells ceases to rise for two hours. Remove the plates, set them in an earthen vessel and cover with water. Clean the sediment out of the cells and wipe them dry. Fill the cells about one-fourth

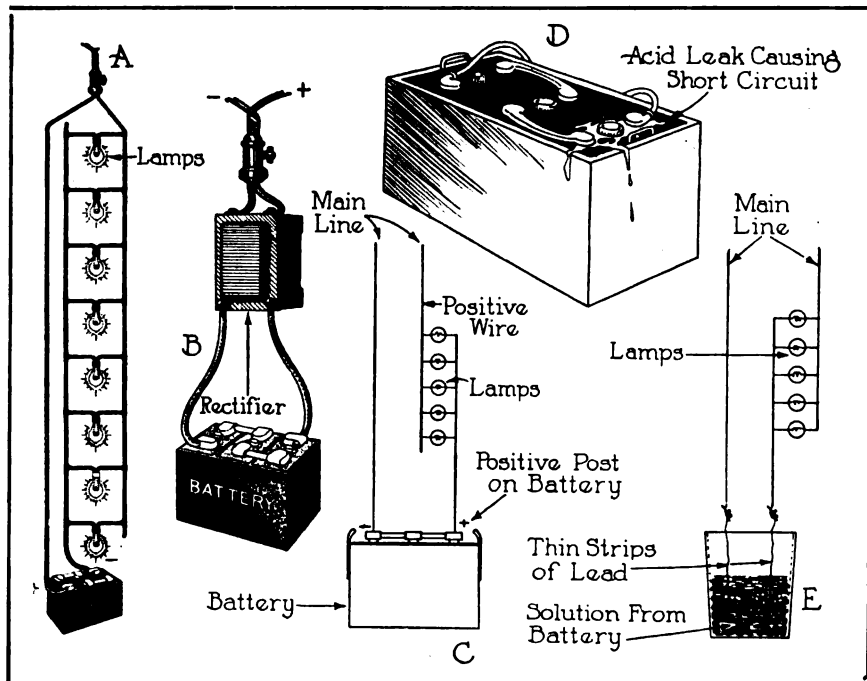
full of 1.300 electrolyte. Then set the plates in the cells and immediately cover with new 1.300 electrolyte. Be careful not to have plates exposed to the air for any length of time. Discharge plates back to a point where gravity tests 1.200. Then charge until the gravity of all the cells cease to rise for two hours. All battery cells should be ventilated to allow the gas which is given off while charging a chance to escape.

Use a good hydrometer for taking the gravity readings and care should be taken to purchase the best possible, as some cheap hydrometers are on the market that have been proven inaccurate.

A sulphated battery should be charged at a very low rate, if the gravity is very low. The charge should be continued for four or five hours after the gravity has ceased to rise. A battery that is out of service should have pure distilled water added and receive a charge at least once every two months.

Batteries are rated in ampere-hours: that is, a 100 ampere-hour battery will supply current for approximately 100 hours at the rate of one ampere, or for 50 hours at a two-ampere rate, etc. Tests prove that most storage batteries fall below their rated capacity, and as the discharge rate is increased the actual capacity decreases.

Direct current must be used for charging bat-



Method of Charging Battery and Testing Polarity of Charging Circuit.

should receive another coat of vaseline. If the terminals are kept well coated with vaseline, corrosion will not occur. The terminals of a battery are usually marked positive (+) and negative (-).

A fully charged battery of about 1.300 specific gravity will freeze at about 90 degrees below zero. A filling syringe should be used when adding water to the battery. Keep the battery and components clean and dry and free from foreign substances.

#### Sediment.

The wearing of a battery causes sediment to accumulate in the bottom of the cells, which must be removed. If the sediment is high enough to



### SOME SUGGESTIONS FOR MAINTENANCE.

teries. If only alternating current is available it must be rectified. A vibrating rectifier, rotary converter, or an alternating current motor driving a direct current generator may be used. The positive and negative charging wires, or battery terminals, can be distinguished as follows: Dip the ends of the wires in salt water, keeping the ends about an inch apart. Bubbles will rise from the negative wire. The wires should be connected to the battery so that the positive charging wire is in contact with the positive terminal, and the negative charging wire with the negative terminal. The difference between alternating current and direct current can be told by dipping the wires in salt water. If alternating current bubbles will arise from both wires, while in the case of direct current, only from the negative.

The user of a battery should keep the top of cells dry and free from foreign substances, keep it charged, keep plates covered by adding pure distilled water at intervals, and see that the terminals do not corrode.

The illustration at A and C shows methods of charging a single battery from a direct current power line using a lamp bank to supply the necessary resistance. The lamps are screwed out at the start of the charge to give the correct amperage, and later as the battery nears complete charge they are screwed in according to the amount of current required. Figure B illustrates a method using a rectifier in the circuit. The rectifier is employed for changing alternating current to direct for charging purposes and in larger sizes is used in service stations for charging several batteries at a time. The rectifier shown in the cut is a small size and well suited for charging a single battery.

Regulation of the charge is accomplished by means of a rheostat attached to the device by which the flow of current is regulated. Such an outfit is considered suitable for the motorist who wishes to keep his battery fully charged, and who does considerable night driving. Whenever the car is left in the garage for any length of time the battery may be put on charge and in this manner kept in a fully charged condition. Where most of the driving is done during the daytime and very little at night, the battery will usually be found to test 1280 or better and charging through spare hours will not be necessary. It is barely possible, under these conditions, that the motorist will find it necessary to have the charging rate of the generator cut down to prevent over-charging of the battery. When most of the driving is done at night it may be advisable to have the generator charging rate increased. Either of these operations should be done by an experienced electrical repairer, as the desired results may not be obtained otherwise.

Figure D well illustrates the result of carelessly spilling electrolyte on the top of the battery. Electrolyte spilled in this manner runs down the side of the wooden case, eating the wood, and also causing a short circuit between the terminals of the coil. Keep the top of the battery clean and shorts cannot occur at this point.

Figure E illustrates the method used when testing the polarity of the charging wires. If a suitable voltmeter is not at hand, dip the ends of the two wires into a glass of water in which a teaspoonful of salt has been dissolved, care being taken to keep the wires at least an inch apart. When the current is turned on fine bubbles of gas will be given off from the negative wire.

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## How a Storage Battery Freezes.

Freezing is the result of the low gravity of the electrolyte which has been reduced to nothing more than distilled water, and as a consequence the water expands, the grid cracks, the active material softens and in time drops to the bottom of the jar. At no time during the winter months should the gravity reading of the battery read below 1280 degrees. Be guided by this table:

Specific Gravity of Battery Solution Freezes at:

1280 (full charge).....	98 below zero
1260 (three-fourths charge).....	60 below zero
1225 (one-half charge).....	38 below zero
1170 (one-fourth charge).....	5 above zero
1150 discharged.....	13 above zero

# Mechanical Specifications of Passenger Cars—1921

REVISED EACH MONTH

**KEY OF ABBREVIATIONS:** \*Against name; first time listed. **PRICE**—① chassis; □ runabout; Δ 4-passenger. **ENGINE**—Colonial; Cont., Continental; Duesen., Duesenberg; H-Spill., Herschell-Spillman; G. B. S., Golden, Belknap & Swartz; Lycoming, Lycoming; Masink, Masnick; N.Orth., North; Rutenber., Rutenberg; Ster., Sterling; Wisc., Wisconsin. **TYPE OF CYLINDER**—L., valves on one side of cylinder; I., valves on opposite sides of cylinder; V., valves in head; F., valves on side and in head; S., sleeve valve. **CAMSHAFT DRIVE**—Heli., Helical; Chin., Chain; Stir., Spur; C.G., Gear. **ENGINE COOLING SYSTEM**—P., Pump circulation; T.S., Thermo-Siphon circulation; Air Cooling, **OILING SYSTEM**—F., Force Feed; S., Splash. **IGNITION SYSTEM**—Eisen., Eisenmann; Conn., Connecticut; G. D. Gray & Davis, Al-Ch.; Allis-Chalmers, At-K.; Atwater Kent, Auto.; Autolite, Split., Splitdorf; U. S. L., U. S. Lighting & Heating; W. Leon., Ward Leonard; N. E., Northeastern; S., Single; D., Double; H., Manual Spark Advance; D., Duplex. **CARBURETOR**—Stum., Stromberg; Schb., Schebler; Tayf., Rayfield; Till., Tillotson; Cart., Carter; Newc., Newcomb; John., Johnson; Marv., Marvel; Holl., Holley; Zenith., Zenith; Buic., Buick; Mill., Miller; Shutes, Shakespear; Mon., Monarch; Stew., Stewart; **CLUTCH**—D., Disc; D-P., Dry Plate; C-C., Oil Cone; C-U., Control Unit; F-D., Friction Drive. **GEAR-SEMI LOCATION**—U-P.P., Unit with Power Plant; Tot., On Forward End of Torque Arm; R-Ex., Unit with Rear Axle; Sep., Geared Independent of Engine or Axle. **TIRES**—C., Clincher; Q., Quick Detachable; S., Straight Side. **REAR AXLE**—F., Floating; D., Dead. **GEARS**—Sp. B., Spiral Bevel; C-U., Control Unit. **DRIVES THROUGH**—S., Springs; A., Axle. **BEARINGS**—B., Ball; R., Roller; P., Plain. **VALVE OVERLAP**—V.O., Valve Overlap; 3P., 3 Cams, Three-Point Cantilever; Plat., Platform. **BEARINGS**—B., Ball; R., Roller; P., Plain.

TRADE NAME AND MODEL			TIRES AND RIMS			ENGINE					IG-NITION SYSTEM		Car-buretor		REAR AXLE				BEARINGS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Price	Weight of Car	Wheelsbase in Inches	Size	Make of Rims	Make of Engine	Number of Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P., S. A. E.	Max. Brake H. P.	I. C. P. M. at Max.	Cylinder Type	Cylinders Cast	Wh. P. Ring Groove	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Ignition System	Make and Type	Make of Starting System	Make	Fed by	Clutch Type	Gearset Location and Forward Speeds	Make	Type	Type of Gears	Gear Ratio	Torque Taken By	Type of Rear Springs	No. Crankshaft Bbs.	Gearset	Rear Axle	Front Wheel																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

TRADE NAME AND MODEL	TIRES AND RIMS			ENGINE										IG-NITION SYSTEM	Car-buretor		REAR AXLE				BEARINGS														
	Price Touring Car	Weight of Road Ready for Car	Wheels in Inches	Size	Make of Engine	Number Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P., S. A. I.	Max. Brake H. P.	R. P. M. at Max.	Cylinder Type	Cylinders Cast		Valve (Clear)	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Oiling System	Make and Type	Make of Starting-Lighting System	Make	Fed by	Clutch Type	Gearset Location and Forward Speeds	Make	Type	Type of Gears	Gear Ratio	Torque Taken By	Type of Rear Springs	No. Crankshaft Bcs.	Gearset	Rear Axle	Front Wheel
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
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Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			
Dodge Brothers	1285	2425/114	32x3 1/2	35x5	Own	4	4 1/2 x 5 1/2	212.24	03	35	2200	Blk	1 1/2	1 1/2	Hel	D	F & S	N. E. A-H	West-1	Stew	V	D	U P 3	Own	F-F	Sp B	4 1/8	1 1/2	Blk	R	R	R			



TRADE NAME AND MODEL	TIRES AND RIMS		ENGINE										IG-NITION SYSTEM	Car-buretor		REAR AXLE			BEARINGS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Price Touring Car	Weight of Car Ready for Road	Wheelbase in Inches	Size	Make of Rims	Make of Engine	Number Cylinders	Bore and Stroke in Inches	Rated H. P. S. A. E.	Max. Brake H. P.	R. P. M. at Max.	Cylinder Type		Cylinders Cast	Wh. P. Ring Groove	(Clear)	Inlet Valve	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Ignition System	Make and Type	Make of Starting-Lighting System	Make	Fed by	Clutch Type	Gearset Location and Forward Speeds	Type of Gears	Type of Gears	Gear Ratio	Car Driven Through	Torque Taken By	Type of Rear Springs	No. Crankshaft Bcs.	Gearset	Rear Axle	Front Wheel																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Nelson	1695	2850 121	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	303 29 40	71 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Nelson, Four-29	1750	3000 130	32x4 1/2	32x4 1/2	Goodyear	Cont	4	4 1/2 x 4 1/2	146 15 60	29 2000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Noma	1500	2084 104	32x4 1/2	32x4 1/2	Goodyear	Cont	4	4 1/2 x 4 1/2	146 15 60	25 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Norwalk	1320	2000 108	32x4 1/2	32x4 1/2	Goodyear	Lycmg	4	4 1/2 x 4 1/2	192 19 35	35 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Oakland	1285	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	177 18 97	44 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Oakland, 34-B	1395	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	248 26 55	58 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Oldsmobile	1285	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	143 18 23	27 1000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Overland	895	1940 100	30x3 1/2	30x3 1/2	Stanwold	Own	4	4 1/2 x 4 1/2	414 38 40	95 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Owen Magnetic	6500	5000 142	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	424 43 20	95 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Packard	9000	4490 136	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	331 33 35	70 2350 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Packard, Twin Six	1770	3140 119	32x4 1/2	32x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	166 16 05	50 3000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Paige-Linwood	3750	3750 131	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Paige, Essex	3750	3750 131	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R	Pann, A.	1895	2900 120	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2
Monroe	1440	2375 115	32x3 1/2	32x3 1/2	Firestone	Own	4	4 1/2 x 4 1/2	149 16 90	44 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto-2	Wagner	Zeni	V	D	U P 3	S	Sp B	4.75	A	3 Cant	2 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Moore	1685	2680 118	32x4	32x4	Firestone	Cont	4	4 1/2 x 4 1/2	224 25 35	45 2200 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Gr	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Murray	1905	2900 106	30x3 1/2	30x3 1/2	Firestone	G-B & S	4	4 1/2 x 4 1/2	188 22 50	36 2800	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Gr	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Nash	1695	2850 121	33x4 1/2	33x4 1/2	Firestone	H-Splm	4	4 1/2 x 4 1/2	332 33 35	58 2700 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
National Sixtett	1695	2850 121	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	249 25 35	35 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Nelson	1695	2850 121	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	303 29 40	71 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Nelson, Four-29	1750	3000 130	32x4 1/2	32x4 1/2	Goodyear	Cont	4	4 1/2 x 4 1/2	146 15 60	29 2000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Noma	1500	2084 104	32x4 1/2	32x4 1/2	Goodyear	Cont	4	4 1/2 x 4 1/2	146 15 60	25 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Norwalk	1320	2000 108	32x4 1/2	32x4 1/2	Goodyear	Lycmg	4	4 1/2 x 4 1/2	192 19 35	35 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Oakland	1285	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	177 18 97	44 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Oakland, 34-B	1395	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	248 26 55	58 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Oldsmobile	1285	2420 116	32x4 1/2	32x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	143 18 23	27 1000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Hel	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Overland	895	1940 100	30x3 1/2	30x3 1/2	Stanwold	Own	4	4 1/2 x 4 1/2	414 38 40	95 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Owen Magnetic	6500	5000 142	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	424 43 20	95 2600 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Packard	9000	4490 136	33x4 1/2	33x4 1/2	Firestone	Own	4	4 1/2 x 4 1/2	331 33 35	70 2350 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Packard, Twin Six	1770	3140 119	32x4 1/2	32x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	166 16 05	50 3000 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Paige-Linwood	3750	3750 131	33x4 1/2	33x4 1/2	Goodyear	Own	4	4 1/2 x 4 1/2	332 33 35	80 2800 L	Bik	4	3 1/2 x 3 1/2	1 1/2	1 1/2	1 1/2	Chn	T-S	F	Conn S-H	Auto	Wagner	Zeni	V	D	U P 3	S	Sp B	4.25	S	Semi	3 B	R	R	R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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TRADE NAME AND MODEL	TIRES AND RIMS		ENGINE										IG-NITION SYSTEM	Car-buretor		REAR AXLE			BEARINGS																		
	Weight of Car	Wheels in Inches	Size	Make of Rims	Make of Engine	Number Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P. S. A. E.	Max. Brake H. P.	R. P. M. at Max.	Cylinder Type		Cylinders Cast	With P. Ring Groove	Diap. Inlet Valve	Lift of Valve (Clear)	Cam Shaft Drive	Type of Cooling System	Type of Oiling System	Make and Type	Make of Starting- Latching System	Make	Fed by	Clutch Type	Gearset Location and Forward Speeds	Make	Type	Gear Ratio	Car Driven Through Torque Taken By	Type of Rear Springs	No. Crankshaft Bcs.	Gearset	Rear Axle	Front Wheel		
Waco T-37	954	2350 112	32x3 5/8	33x5	Firestone	Wisc	43x4 1/2	188 22 50	37			I	Blk	2	2 1/4	1 1/4	Hel	P	F & S	Split	West	Scab	V	D	U P 3	Timken	F	Sp B	3.77 S	A Semi	5 R	B	R	R	R	R	R
Wasp 211	6500	3700 132	33x5	33x5	Firestone	Cont	63x4 1/2	223 25 35	46 2690 L			Blk		2	2 1/4	1 1/4	Hel	P	F & S	Delco-3	Stant	V	D	U P 3	Timken	F	Sp B	5.09 S	A Semi	5 R	R	R	R	R	R	R	
Westcott C-38	2294	3100 118	32x4 1/2	33x4	Firestone	Cont	63x4 1/2	223 25 35	46 2690 L			Blk		2	2 1/4	1 1/4	Hel	P	F & S	Delco-3	Stant	V	D	U P 3	Timken	F	Sp B	5.09 S	A Semi	5 R	R	R	R	R	R	R	
Westcott C-48	2969	3600 125	32x4 1/2	33x4	Firestone	Cont	63x4 1/2	223 25 35	46 2690 L			Blk		2	2 1/4	1 1/4	Hel	P	F & S	Delco-3	Stant	V	D	U P 3	Timken	F	Sp B	5.09 S	A Semi	5 R	R	R	R	R	R	R	
Willy-Knight 20T	2194	3695 121	34x4 1/2	34x4 1/2	Stanwell	Owa	63x4 1/2	240 27 23	53 2200 S			Blk		2	2 1/4	1 1/4	Hel	T-S	F & S	Conn S	Auto-2	Tilt	V	C	R A 3	Timken	F	Sp B	4.43 S	A Semi	3 B	R R	4 B R R	4 B R R	4 B R R	4 B R R	
Winton 33	4600	4300 132	35x5	35x5	Firestone	Owa	63x4 1/2	348 33 75	70 2200 S			Blk		2	2 1/4	1 1/4	Hel	P	F & S	Boech S-H	Bijur-2	Stamb	V	D	U P 4	Timken	F	Sp B	4.90 S	A Semi	4 B	R R	4 B R R	4 B R R	4 B R R	4 B R R	
Wolverine	3500	2340 117	32x4 1/2	32x4 1/2	Firestone	Dusen	43x4 1/2	188 22 50	37			Blk		2	2 1/4	1 1/4	Hel	P	F & S	Boech S-H	Bijur	Stamb	V	D	U P 4	Timken	F	Sp B	4.90 S	A Semi	4 B	R R	4 B R R	4 B R R	4 B R R	4 B R R	

## SPECIFICATIONS OF STEAM PASSENGER CARS

Name and Model	Price	Wheel-Base	Type of Boiler	Boiler Location	Fuel Used	Burner Type	Condensing or Non-Condensing	Engine Type	Valve Gear	Type of Valve	No. Cyl.	Bore and Stroke	Engine Location	Final Drive	Gear Ratio	Tire Size	Type of Rear Spring	Car Drives Through	Torque Taken by
Doble Detroit	5000	135	Semi Flash	Hood	Kero	Atomizing	Condensing	Simp D Act	Own	Slide	2	5x4	Rear Axle	Spir Gr	1.28	35x5	Semi	Springs	Eng. Frame
Stanley 735	3950	130	Fire Tube	Hood	Kero	Vaporizing	Condensing	Simp D Act	Slide Link	Slide	2	4x5	Rear Axle	Spir Gr	1.50	34x4 1/2	Elliptic	Springs	Eng. Frame
Super-Steamer	3000	125	Fire Tube	Hood	Kero	Burnon	Condensing	Simp D Act	Slide Link	Slide	4	3 1/4 x 5	Rear Axle	No Gr		33x4	Semi	Springs	Eng. Frame

## Brief Facts and Features of the Automobile Industry in 1920

By Alfred Reeves, General Manager, National Automobile Chamber of Commerce.

### AUTOMOBILE USE.

Automobiles registered in U. S. (approx.)..... 8,500,000  
 Passenger cars registered in U. S. .... 7,600,000  
 Motor trucks registered in U. S. .... 900,000  
 Cars and trucks owned by farmers..... 2,500,000  
 Per cent. of registration in towns of 5,000 population or less..... 55%  
 Per cent. of 1920 output bought by agricultural districts..... 33%  
 Passenger cars owned by doctors..... 60%  
 State-owned cars and trucks..... 110,000  
 Municipally-owned cars and trucks..... 30,125  
 Cars and trucks entering and leaving New York city daily..... 10,314  
 Persons carried to and from New York daily by car and truck..... 154,725  
 Trucks owned by farmers..... 420,095  
 Labor saving value of truck to each farmer annually..... 80,000  
 Saving in transport charges to each farmer annually through use of truck..... \$249

### AUTOMOBILES' PART IN NATION'S BUSINESS.

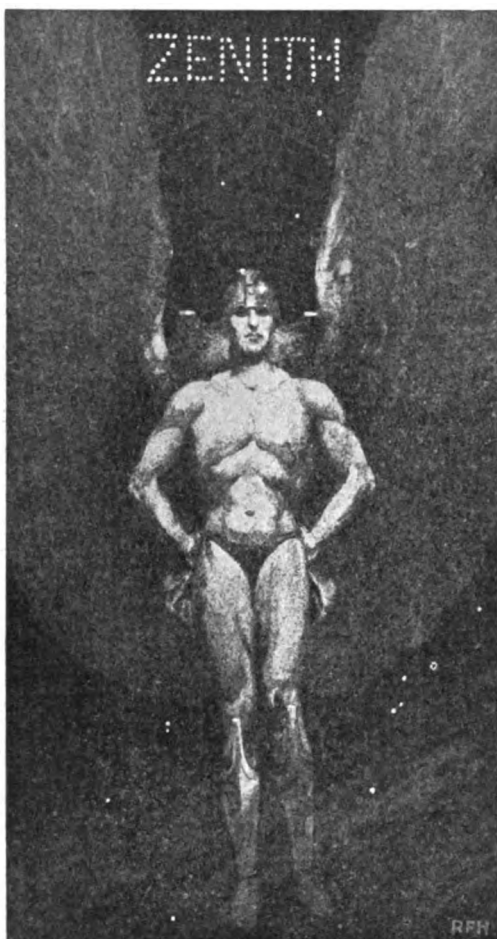
Amount of special taxes paid annually by industry to Federal government..... \$257,000,000  
 Registration fees paid by car users..... \$81,000,000  
 Per cent. of all cars used more or less for business..... 90%  
 Per cent. of total mileage used for business..... 60%  
 Gain business efficiency from use of car as reported by average owner..... 57%  
 Average increase in doctors efficiency through use of car..... 104%  
 Per cent. of steel supply used by automobile industry..... 4%  
 Amount paid by industry to railroads for freight on shipments of finished motor vehicles..... \$100,000,000

### PRODUCTION IN 1920.

Cars and trucks produced..... 2,241,000  
 Passenger cars produced..... 1,906,000  
 Motor trucks produced..... 335,000  
 Wholesale value of cars and trucks produced..... \$2,136,133,676  
 Wholesale value of passenger cars produced..... \$1,703,437,213  
 Wholesale value of motor trucks produced..... \$432,746,463  
 Average wholesale price of passenger cars produced..... \$697  
 Average wholesale price of motor trucks produced..... \$1,273  
 Motor truck manufacturers in production..... 170  
 Passenger car manufacturers in production..... 90  
 States in which factories are located..... 32  
 Employees engaged in car and truck manufacture..... 300,000  
 Automobile tires manufactured..... 32,400,000  
 Increase in gasoline production over 1919..... 19%

### AUTOMOBILE EXPORTS IN 1920

Value of motor vehicles and parts exported, including engines and tires..... \$338,000,000  
 Number of passenger automobiles exported..... 153,000  
 Increase in number of passenger cars exported..... 120%  
 Value of passenger cars exported..... \$155,000,000  
 Number of motor trucks exported..... 27,000  
 Increase in number of trucks exported..... 60%  
 Value of motor trucks exported..... \$45,000,000  
 Number of countries to which automobiles were exported during year..... 114  
 Passenger car dealers..... 36,210  
 Motor truck dealers..... 20,596  
 Garages..... 38,538  
 Repair shops..... 47,556



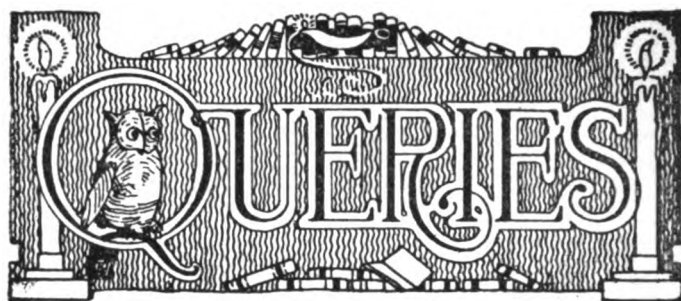
**WHAT** automotive authorities think of the Zenith carburetor is indicated by the fact that Zenith is standard equipment on the majority of European automobiles and on more than one hundred American makes of motor cars and trucks.

**Zenith Carburetor Co.**

New York  
Lyons

DETROIT  
London

Chicago  
Turin



#### TIMING OF ALCO.

(H. G., Canton, Mass.)

I have an Alco (made by the American Locomotive Co.) and I have trouble with the timing. The engine has a magneto. The water heats and the engine seems to be late, yet I have timed it according to the marks on the flywheel. What can you advise me?

You do not state whether the engine is used in a car or a truck chassis, and you assume that the defect is in the timing as the water heats and the engine appears to fire late. This information is indefinite and by no means sufficient to justify an accurate conclusion. The timing may be incorrect and yet the heating may be due to any one of several causes.

The primary causes of overheating may be low water in the cooling system, constricted holes in the gaskets in the connections, between engine and radiator, deteriorated hose connections, deposits on the inner walls of the cylinder jackets or radiator tubes or cells, obstructed cells in the radiator cooling section; or it may be due to a loose fan belt, tight fan shaft bearing, bent fan blades, broken pump shaft, pin lost from pump shaft coupling, pin lost from pump shaft gear, loose or worn pump impeller; or the cause may be poor oil, shortage of oil, too rich a mixture with a retarded spark, inaccurate valve setting, preignition, lack of compression, inaccurate meshing of timing gears, inaccurate ignition timing, leaks in intake or exhaust manifolds, valves not seating, carburetor adjustment, lost motion in linkage operating carburetor or ignition systems, leaky carburetor float; or it may be several of these causes in combination.

To discuss each of these causes separately and detail the necessary restoration, including mechanical work, is hardly practical. The condition of the radiator with reference to cooling can be determined by noting whether after running the engine the cooling section is nearly or quite at boiling at the top and fairly cool at the bottom. If this condition exists there is reason to assume the water does not circulate and the cause may be deposits in the radiator or engine jacket, the failure of the pump from one of the causes stated. The cylinder jacket and radiator may be cleared of deposits by dissolving two ounces of sal soda to each gallon of water required to fill the system, in hot water and putting it into the radiator with fresh water. Then run the engine with the water as near boiling as is possible for a half hour. Drain the system, let the engine cool, refill with fresh water, again run until it is at the boiling point, drain the second time, cool the engine and again fill the radiator.

Examination of the hose connection, the gaskets, the pump shaft gear, the pump shaft, the pump shaft coupling and the pump will determine the other causes probable with the cooling water circulation, and the condition of the fan belt and the fan shaft can be ascertained by inspection. Whether or not the lubricating system is defective can be learned by observation (if there is a sight gauge) or by draining the reservoir and refilling it with fresh oil. If drainage and replenishment makes restoration of power the cause has in part, at least, been located; if not, there should be examination of the system to determine if there is normal circulation of oil.

Test of compression will establish if the wall of any one cylinder has been scored, if a piston ring has broken, or any other cause that would lessen the pressure. This can be by hand cranking or, if possible, with a pressure gauge. The condition of the cylinders with reference to carbon deposits can be learned by removing the valve caps and testing with

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scraper. Burning the carbon would make some difference in engine power and would insure against preignition. Leaks of the manifold gaskets can be found by squirting oil around the flanges of the exhaust and noting it for bubbles, or by squirting gasoline around the flanges of the intake, which would cause slight acceleration of the engine for a brief period. Whether or not the valves seat can be learned by removal and examination. There should be about 6/1000 inch clearance of the inlet valves and about 10/1000 inch clearance of the exhaust valves when the engine is cold, and this can be checked by using a gauge between the valve stem ends and the adjusting screws of the tappets.

The car was built not later than 1914 and possibly before, and if used it may be much worn. This wear may be such as to generally affect the valve action, so that all will be late. This may appear in wear of the timing gearset (assuming the gears are correctly meshed), the cams, the valve tappets or the valve stems may be shortened by wear. Possibly the valves have been ground so many times the timing is, from this and the other causes specified, much later than was intended by the designer. You state that the engine has been timed by the flywheel marks, but this would not compensate for wear of the timing gearset and the valve mechanism. This condition may be the cause you are seeking.

You state that the engine is fired by a high-tension magneto. In the absence of the name of the maker no specific statement can be made relative to this, but the following rule will generally apply. Bring the piston of No. 1 cylinder to top dead center between the compression and firing strokes. By removing a spark plug and using a rod you can check this position with the flywheel marks. Do not follow valve action, for this may be late. One full turn of the flywheel will bring the piston to the position between the exhaust and the suction stroke. Try again for top center and note the valve action. Turn the second revolution to top center between the compression and firing stroke. After the piston has been located connect the lever advancing and retarding the magneto. By moving the hand lever you will note whether the breaker box or the breaker arm is advanced (moved in a direction opposite to that in which the breaker and cam revolve when driven by the engine). There should be very little lost motion in the linkage, and if such exists this should be taken up and then the lever should be advanced from 1/10 to 1/4 the distance of travel from a fully retarded position. At this point the cam or the breaker cam shaft should be set to just open the contacts. If the breaker can be removed from the shaft it should be taken off, but if the cam is permanently secured to the shaft, the shaft will generally be in two sections, one section carrying the breaker cam and the other being driven by and coupled to the engine. The shaft sections may be coupled by a sleeve with one or more clamping screws, or other means. Whatever the means of drive the breaker camshaft must be movable without turning the engine or moving the piston.

With the camshaft of the breaker free it should be turned slowly in the direction it runs when driven by the engine until the contact points are seen to close and then to just separate. With the cam the control connections and the piston in the positions stated, the camshaft drive should be secured.

This information is intended to be applied in the event that the timing is late because of wear; otherwise the usual method of timing (assuming the setting of the magneto is correct) should apply.

#### SUBSTITUTING AMMETER FOR INDICATOR.

(J. W. A., Lowell, Mass.)

I have a Franklin car, late model, to which I wish to fit an ammeter instead of the indicator with which it is now equipped. Can this be done without making radical changes in the wiring?

Is it possible to connect a cut-out on this car to eliminate discharge of the battery when the car is moving slowly which will do away with throwing of the switch on and off to prevent stalling of the engine?

An ammeter can be fitted to your car without changing

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Socony is first and foremost a dependable gasoline. Its low boiling-point insures complete combustion and full power at all times. Use Socony regularly—for all-year economy.

Don't flood your engine with gasoline in cold weather to start it. Socony ignites quickly, without unnecessary spinning of the motor.

Look for the red, white and blue Socony sign.

STANDARD OIL CO. OF NEW YORK

# SOCONY

REG. U.S. PAT. OFF.

## MOTOR GASOLINE

*"Every Gallon the Same"*

*Every motor highway and byway throughout picturesque New England and New York is a part of the long "Socony Trail".*

# COES *The Standard WRENCH*



**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.

## GREB RIM TOOL



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

**DO THE SENSIBLE THING.**

Provide yourself with the best rim tool on the market and save time, trouble and rims.

### GREB RIM TOOL

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**TEN DAYS' TRIAL.** If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

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*Booklets on Request*

**THE BARRETT COMPANY**

New York Chicago Philadelphia Boston St. Louis Cleveland Cincinnati Pittsburgh Detroit Birmingham Kansas City Minneapolis Nashville Salt Lake City Seattle Peoria



the wiring by simply removing the indicator and connecting the ammeter in its place. Care should be taken, however, to connect it properly; that is, the ammeter should read "charge" when the engine is turning at a speed equalling 15 miles an hour or better and up to 30. Below 15 miles an hour the ammeter should read discharge. If connected wrongly, reverse the connections and the ammeter will read correctly.

From your description of connecting and using a cut-out we understand that you wish to get rid of the trouble of the engine stalling when travelling slowly in traffic in high gear. This practise is not to be commended, as it is much better for the operator to change to a lower gear, changing back into high as the traffic thins out. If the carburetor arm adjusting screw is set so that the engine turns over very slowly and does not fire steadily, this would cause stalling. Set the adjusting screw so that the engine idles easily without racing and it will be found, usually, that the engine will not stall in traffic unless made to pull under too great a load. The Franklin Motor Co. has for the last few years made use of an electric starting system known as a non-stalling system, which is designed to overcome this difficulty, giving the operator a chance to throw the starting lever into such a position that the starter acts to start the engine whenever it stalls in traffic. This feature is patented and is found exclusively on Franklin cars. The cut-out would not solve the problem for you, but we would advise that you check over the ignition carefully, noting the spark gap at the points and the breaker points. These should be set slightly under 1/32 of an inch and should be clean and free from lint. Note whether the breaker points are burned; if they are, fit new points. We believe that your trouble can be remedied by careful attention to the points named and the trouble of the engine stalling partially, if not wholly, eliminated.

### SLIGHT KNOCK IN MOTOR.

(D. S. M., Canton, O.)

At times my motor makes a slight knock, which seems to come from some part of the cylinders. Can you tell me what may cause it?

A knocking sound in a motor may come from a variety of causes. It usually means a loosened bearing, which should be located and remedied immediately or trouble may follow. It may be due to carbon forming in the head of the engine, an overheated engine, or spark advanced too far. When you notice such a knock, retard the spark and see if the noise stops. Next determine if the motor is overheated. If it steams at the radiator or runs after the switch is thrown off, it is an indication that it is overheated or is being fired by glowing carbon. Remove the spark plug and see if it is carbonized badly. If so, have the carbon removed by burning out or scraping. If the knocking then still continues, it may be caused by piston slap, but this is usually the case only on engines that have been run for a considerable length of time. As the piston comes to the top on the compression stroke, it leans to the right hand side of the cylinder; as it goes down on the power stroke it leans to the left. If the piston is badly worn it may strike a blow as it goes over the center. For this condition there is no remedy except to rebore the cylinders and fit new oversize pistons and rings. Sometimes a knock may be caused by the valve tappets being out of adjustment.

### MOTORCYCLE MANUFACTURERS.

(J. L., Newark, N. J.)

Can you name for me a few manufacturers of four-cylinder motorcycle engines?

Excelsior Motor Manufacturing Co., 3701 Cortland Street, Chicago, Ill.; Ace Motor Co., Philadelphia, Pa.

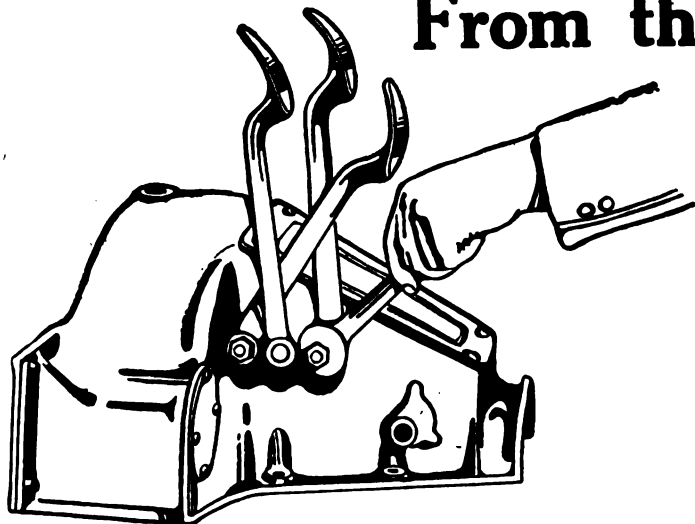
The Excelsior Motor Manufacturing Co. purchased the Henderson Motor Co., which manufactured a four-cylinder, shaft-driven motorcycle, and now produces an engine that is practically the same, if not identical with that produced by the latter concern.

The Ace Motor Co., was organized by Henderson, after the sale of the Henderson Motor Co., and also builds an engine that closely resembles, but differs somewhat from the original Henderson engine.

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# Quick, Easy Adjustment From the Seat



*Ford brake and reverse bands must have frequent adjustment. This, the dirtiest job on the Ford is eliminated with the installation of*

## Michon Outside Adjusters

### Lengthen Life of Brake Band Linings 100% to 500%

Due to the instant, easy adjustment from the seat, Michon Equipment eliminates over-adjustment. Permits gradual adjustment as bands wear down. This lengthens life of band linings from 100% to 500%, which, alone, pays for the equipment. Properly adjusted brakes prevent accidents, lessen chatter and lengthen the life of the car. The illustration above shows the ease of making adjustment on the Michon equipped Ford.

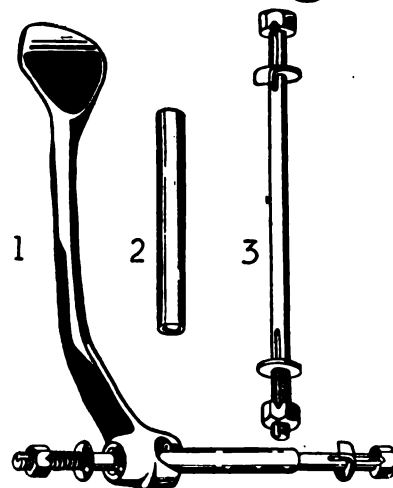
### Quickly and Easily Installed

The installation of Michon Equipment requires but a few minutes. The simplicity of the device is shown by the illustration at the right. There are no holes to bore or changes to be made to transmission housing or cover. Replaces regular Ford parts—fits perfectly—will outlast car. Fully guaranteed.

### To Accessory Jobbers and Dealers

Michon Outside Adjusters are put on the market to meet the need for a convenient, efficient means of brake adjustment. Michon Products are distributed through the regular channels only and their sale promoted by an aggressive advertising campaign in leading trade papers. Write today for details and prices.

Manufactured by  
**MICHON MFG. CO.,**  
Toledo, Ohio.



1. Pedal and complete Michon Equipment assembly. 2. Tubular shaft. 3. Extension shaft which operates band.

Retail Price, per set

**\$3.00**

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214 N. Erie St., Toledo, Ohio

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REGISTERED  
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**FUEL,  
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CAR EFFICIENCY,  
CAR SERVICE LIFE,  
FULL CAR SATISFACTION**

EAGLEINE Quality has been proven by years of experience of motorists who know.

EAGLEINE Oils are made in grades for all engines.

They cost no more than inferior oils; they are sold in sealed containers in sizes to meet all requirements.

Measured by service EAGLEINE oils are the cheapest.

Start your saving with EAGLEINE today.

Sold by all dealers or direct.

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**44-45-46 India Street, Boston, Mass.**

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**Woolworth Building**

**CHICAGO**  
**1132 W. 37th Street**

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JOURNAL**  
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**Here It Is, Always Ready.**

**Saves Gas, Saves Oil, Saves Battery, Saves Time.**

Patent applied for

**THE G. & G. ELECTRIC MANIFOLD HEATER**

Starts your motor any place, any time, summer or winter. Zero weather just the same.

Easy to install between manifold and carburetor flange. No obstruction in gas passage of manifold.

Not injured by vibration.

Sold postpaid ready to install.....\$7.50

Pilot Light to show current on.....\$1.00 extra

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Manufactured only by

**The G. & G. Electric Heater Co., Lafayette, Ind.**

# AUTOMOBILE JOURNAL

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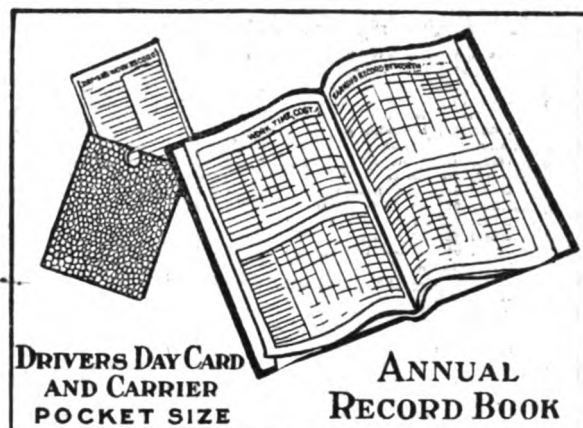
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\*Indicates Article Is Illustrated.

Know what it costs to Run your Truck  
Learn what your Truck Earns  
Know your Truck Profit and Loss

## UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

**Price \$12.50 — Delivered**

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**MOTOR TRUCK**

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Iron Age  
Iron Trade Review  
Lumber  
Lumber Trade Journal  
Lumber World Review  
Manufacturers' Record  
Manufacturing Jeweler  
Marine Engineering  
Marine Review  
Metal Worker, Plumber and Steam Fitter  
Millinery Trade Review  
Mill Supplies  
Mining and Scientific Press  
Modern Hospital  
Motor Age  
Motorcycle and Bicycle Illustrated  
Motor Truck  
Motor World  
National Builder  
National Druggist  
National Petroleum News  
Nautical Gazette  
Northwest Commercial Bulletin  
Northwestern Druggist  
Nugent's, The Garment Weekly  
Oil News  
Oil Trade Journal  
Plumber & Steam Fitter  
Power  
Power Boating  
Power Farming Dealer  
Power Plant Engineering  
Price Current—Grain Reporter  
Printers' Ink  
Railway Age  
Railway Electrical Engineer  
Railway Maintenance Engineer  
Railway Mechanical Engineer  
Railway Signal Engineer  
Retail Lumberman  
Rubber Age & Tire News  
Shoe Findings  
Shoe and Leather Reporter  
Shoe Retailer  
Southern Engineer  
Southern Hardware and Implement Journal  
Sporting Goods Dealer  
Starchroom Laundry Journal  
Tea and Coffee Trade Journal  
Textile World Journal  
Welding Engineer  
Woodworker

## THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS: 220 West 42nd Street NEW YORK CITY

(When Writing to Advertisers, Please Mention the Automobile Journal.)



# ADVERTISING

By DR. FRANK CRANE

(Copyright by Frank Crane)

**A**DVERTISING is the greatest business in the world. That is not because it enables business people to sell more goods, not because it is a way to make great profits. Nothing can be really great for any purely dollars-and-cents reason.

It is because, in advertising, business becomes vocal. When, in the course of evolution, the animal acquired speech and became able to utter himself, he had made the longest stride in development. He had stepped from brute to man.

The human soul dates back to the first word. "In the beginning was the Word."

Advertisement is the utterance of human energy. Craftsmanship is good, and industry, and organization, and business ability; but they are dumb giants until they find speech—dumb and dangerous.

Business, including manufacturing, farming, transportation, and selling, is to the new world what fighting was to the old. The old world organized only to kill, and its genius was displayed by great generals. Its heroes were the mighty killers. To them it set up its statues.

The new world, typified by, led by America, is organized to serve, to make

human life richer, deeper, stronger, more complex and heterogeneous.

And business is simply service. Business comes to itself, attains maturity and full self-expression only through advertising.

Advertising is the breath of life breathed into the nostrils of business, by which it becomes a living soul.

Thus advertising not only enlarges business; it radically changes the nature of business.

By it business passes from bureaucracy and autocracy into democracy. It takes the whole people into its growth. It enters the veins of the commonwealth. It becomes a function of communal life.

Without advertising comes decay and death.

Nations need advertising. If they would advertise they would prevent war. War is the self-expression of dumb brute force. *Advertising is the self-expression of intelligent strength that knows how to speak.*

It is the something plus in advertising that is significant. It is this something plus that makes advertising to business what art is to handiwork, what music is to feeling, what language is to the soul.

## LIST OF MEMBERS

*Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service*

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American Blacksmith  
American Exporter  
American Funeral Director  
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Automobile Dealer and Repairer  
**Automobile Journal**  
Automotive Industries  
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Boiler Maker  
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Buildings and Building Management  
Building Supply News  
Bulletin of Pharmacy  
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Canadian Railway & Marine World  
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Daily Metal Trade  
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Dry Goods Economist  
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Dry Goods Reporter  
Electric Railway Journal  
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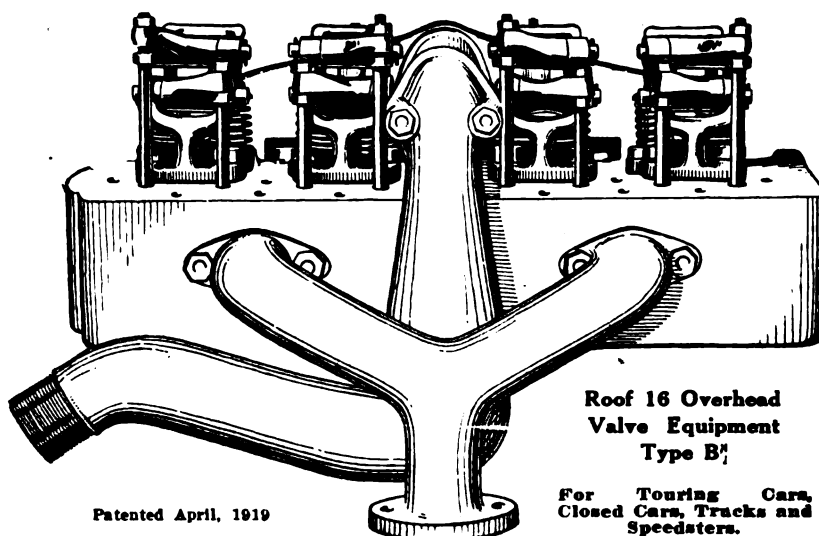
Electrical World  
Embalmers' Monthly  
Engineering and Contracting  
Engineering and Mining Journal  
Engineering News-Record  
Factory  
Farm Implement News  
Farm Machinery—Farm Power  
Fire and Water Engineering  
Foundry (The)  
Furniture Journal  
Furniture Manufacturer and Artisan  
Furniture Merchants' Trade Journal  
Gas Age  
Gas Record  
Grand Rapids Furniture Record  
Haberdasher  
Hardware Age  
Heating and Ventilating Magazine  
Hide and Leather  
Hospital Management  
Hotel Monthly  
Illustrated Milliner  
Implement and Tractor Age  
Implement & Tractor Trade Journal  
Industrial Arts Magazine  
Inland Printer  
Iron Age  
Iron Trade Review  
Lumber  
Lumber Trade Journal  
Lumber World Review  
Manufacturers' Record  
Manufacturing Jeweler  
Marine Engineering  
Marine Review  
Mill Supplies  
Millinery Trade Review  
Mining and Scientific Press  
Modern Hospital

Motor Age  
Motorcycle and Bicycle Illustrated  
Motor Truck  
Motor World  
National Builder  
National Druggist  
National Petroleum News  
Nautical Gazette  
Northwest Commercial Bulletin  
Northwestern Druggist  
Nugent's, The Garment Weekly  
Oil News  
Oil Trade Journal  
Plumber and Steam Fitter  
Power  
Power Boating  
Power Farming Dealer  
Power Plant Engineering  
Price Current—Grain Reporter  
Printers' Ink  
Railway Age  
Railway Electrical Engineer  
Railway Maintenance Engineer  
Railway Mechanical Engineer  
Railway Signal Engineer  
Retail Lumberman  
Rubber Age and Tire News  
Shoe Findings  
Shoe and Leather Reporter  
Shoe Retailer  
Southern Engineer  
Southern Hardware & Implement Journal  
Sporting Goods Dealer  
Starchroom Laundry Journal  
Tea and Coffee Trade Journal  
Textile World Journal  
Welding Engineer  
Woodworker

THE ASSOCIATED BUSINESS PAPERS, INCORPORATED  
HEADQUARTERS - - 220 WEST 42nd STREET - - NEW YORK

(When Writing to Advertisers, Please Mention the Automobile Journal.)

# POWER and SPEED ROOF 16 OVERHEAD VALVE EQUIPMENT for FORD MOTORS



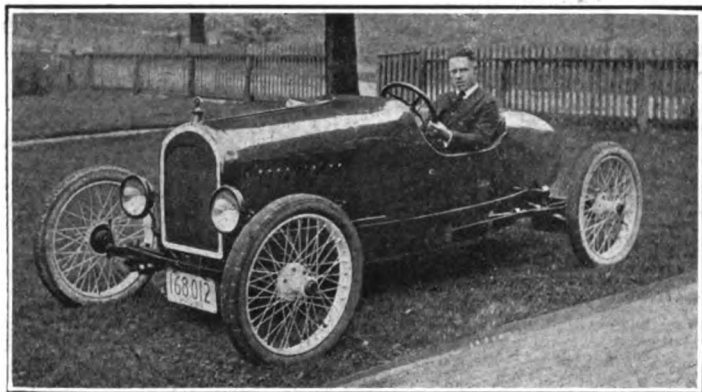
Patented April, 1919

Roof 16 Overhead Valve Equipment Type B

For Touring Cars, Closed Cars, Trucks and Speedsters.

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same motor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at Bureau of Standards with Type B gave 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 3 to 1 gears, high speed camshafts, aluminite, light grey iron pistons, lynite pistons, alu-

inite connecting rods, racing spark plugs, racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high tension magnetos, special oiling system, special worm and gear, steering gear, racing tires, racing bodies, hood and radiator, parts for underlugging chassis. Tell us what you want. We can supply it. Racing quality. Lowest prices. Send for our Complete Literature on how to build fast cars and double the value of your converted Ford Truck and descriptive circular on Speed and other Specialties for Fords.



Ernest Watson

Attleboro, Mass.

Ernest Watson, Attleboro, Mass., in his beautiful Laurel equipped Ford racing car, which has easily attained speeds of more than 70 miles an hour.

## Ford Racing Car Speed Kings

From the hundreds of fast Ford car drivers we mention the names of a few of those who have won laurels through the use of our equipment and some with speed records approaching that of the highest priced racing cars in the world, ranging from 70 to 97 miles per hour, and who on mile and half-mile tracks have closely approached the world's record with their speed cars:

Paul M. Boozer.....Windber, Penn.  
Tracy D. Mohney.....Pittsburg, Pa.  
Ben Lawell.....Columbus, Ohio  
W. L. Frazier....Washington, D. C.  
Herbert Black....Webster City, Iowa  
John Proctor.....Washington, D. C.  
Rolly Blair.....Shelby, Neb.  
Joseph C. Hayes..San Francisco, Cal.  
Aubrey Beretta..Babylon, L. I., N. Y.  
Hugo Goedthe.....Milwaukee, Wis.  
W. C. Phalgraff...Cheyenne, Wyo.  
Milner Motor Car Co....Monroe, La.  
C. F. Goltry.....Roann, Ind.  
Fred Dawson.....Springfield, Ill.  
W. C. Norris Motor Car Co.....  
Oklahoma City, Okla.  
Alvin A. Pfeiffer....Clatonia, Neb.  
J. Ross Castendyck....La Salle, Ill.  
Fred Hank.....Cheyenne, Wyo.  
L. E. Kerbs.....Otis, Kan.  
Phil M. Kepley....New Albany, Ind.  
A. Malby.....Daytona, Fla.

Robert Cusick.....Denver, Col.  
Chas. Skinner.....Willow Bunch, Sask.  
Joe Melson.....St. Charles, Ill.  
Slak Motor Co.....Darlington, S. C.  
Dean C. Montgomery.....Atlanta, Ill.  
J. Christiansen & Son..Galveston, Tex.  
Bozanni Bros.....Los Angeles, Cal.  
J. Marshall Yeats...Champaign, Ill.  
Kirby Horton.....Cleburne, Texas.  
N. H. Steele.....Racine, Wis.  
John G. Banzhaf...Greenwich, Conn.  
Richard O. Fay.....Xenia, Ohio.  
R. C. Wheeler....Chattanooga, Tenn.  
W. J. Meagher.....Medford, Ore.  
Bert Wellington....Casper, Wyo.  
N. C. Burdett.....Stuart, Ia.  
Perry La Merte....Kalamazoo, Mich.  
Albert Willshaw.....  
Ft. Wadsworth, N. Y.  
Willard Brothers..Ponca City, Okla.  
Roy A. Tolen.....Carlow, Mo.  
W. H. Hooker....Bay Side, L. I., N. Y.

Cliff Duhme.....Cincinnati, Ohio  
Brinker & Sheffer..Gibsonburg, Ohio  
Roscoe J. Whitney..Leominster, Mass.  
Frank Richardson...Sagourney, Ia.  
Roy A. Scofield....Council Bluffs, Ia.  
Rister Garage.....New Harmony, Ind.  
Dennis Auto Co.....Ottawa, Kan.  
Tunica Motor Co.....Tunica, Miss.  
Irving Donohoe....Washington, D. C.  
Speedster Shop....Los Angeles, Cal.  
William Erwin.....Corcoran, Cal.  
Don Husted.....Marshall, Okla.  
Charles N. Davis...Piedmont, Mont.  
Antone Bertoglio.....  
Twin Bridge, Mont.  
D. E. Snider.....Middletown, Ohio  
Roy M. Barzen.....  
Thief River Falls, Minn.  
Bay View Auto Co....Cheriton, Va.  
A. Jackson.....Bloomington, Ill.

Get Our Special Circular on Long Mileage Tires and Illustrated Folder Showing Our Full Line of Special Touring, Roadster and Racing Bodies for Fords.

Write for Our Agency Terms and Prices TODAY

Sixteen Valve Cylinder Heads for Dodge Motor after January 1, 1921.

## THE LAUREL MOTORS CORPORATION

ANDERSON, IND.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., FEBRUARY, 1921.

NO. 7.

## Boston Show to Be Brilliant and Businesslike

*Will Auspiciously Open New England's Automotive Activities with Best Exhibition in History*

**A**N INNOVATION this year at the 19th annual Boston Automobile Show, March 12 to 19, inclusive, will be a supplementary display of enclosed cars in the ball room of the Copley Plaza Hotel, under the same management. This is stated as indicative of the proportions that will be attained by this season's offerings of passenger cars, commercial motor vehicles and accessories, when it is remembered that the mammoth Mechanics' building, which will house the main show, affords 105,000 square feet of exhibition floor space.

Eighty-seven different makers of passenger cars, showing more than 350 distinct models, 57 manufacturers of trucks, with a probable showing of some 236 models, and 358 exhibits of accessories is a summary of the magnitude of this signal 1921 event. Eight cars new to the Boston show will be seen, the Wills-St.

Claire, Dixie Flyer, Dorris, DuPont, Gardner, Hanson, Kelsey and Handley-Knight. The following makes of trucks are new to Boston show attendants: Facto, Lansden, Old Hickory, Rainier and Ajax.

The accessory department has been somewhat of a problem to the management because of the extraordinarily large number of manufacturers and agents who have motor equipment which they wish to introduce to the New England public and realize that it can best be done at the Boston show. The demand for space has been record breaking, and the display of accessories, parts and equipment will be the largest and most comprehensive in the history of this exhibition. Manager Campbell has given this department his personal attention and has weeded out many of the fads that he regarded as "unfit" from a utilitarian or other standard. He has striven

to accept only such accessories that are of the highest caliber. As a result of his efforts there will be a number of new equipment manufacturers represented here for the first time. The great majority of the exhibitors in this department are said to be members of the Accessory Manufacturers' association.

The location of the Mechanics' building on Huntington avenue is well known to thousands who have been following up these shows in the past and it is hardly necessary to call attention to the fact that the Copley-Plaza hotel on Copley square, where the overflow closed car show is to be staged, is within a few minutes' walk of the scene of the main exhibition.

### Location of Exhibits.

The exhibits will be well classified this year as in the past and located according to classification in departments, as follows:



J. H. MacAlman, President, Boston Automobile Dealers' Association.



Chester I. Campbell, General Manager, Boston Automobile Show.



J. A. Hathaway, President, Boston Commercial Motor Vehicle Association.

Department A comprises spaces 1 to 38, inclusive, and will be occupied by passenger cars only. Department B includes spaces 100 to 151, inclusive, and is also to be exclusively occupied by passenger cars. These are on the main floor of the building.

Departments C and D are on the basement floor. The former comprises spaces 200 to 271, inclusive, and is for the showing of commercial motor vehicles. The latter, spaces 300 to 436, inclusive, is for the exhibit of passenger cars, commercial vehicles, sundries and machinery.

Departments E, F and G are on the balcony floor. In E, which overlooks Department A, are spaces 400 to 450 inclusive and will contain exhibits of passenger cars only and accessories. Department F, spaces 500 to 564, inclusive, will house automobile accessory displays. Department G includes spaces 600 to 632 and 700 to 733 inclusive, and are for the exhibit of automobile accessories.

No second-hand or rebuilt car will be shown and the same rules in regard to sub-letting of spaces, signs, admission and removal of displays, etc., will be in force this year as heretofore.

#### Decorations and Other Features.

It is understood that the management has worked out an especially elaborate decorative setting of unique design and that the aim will be to make this the most brilliant affair of the kind in the annals of automobile showdom from all aspects, but at the same time the atmosphere of strict business will be maintained. The usual fine musical attractions may be expected in the various sections, and the social side will not be neglected, although no calendar of special days has as yet been announced.

The admission of exhibitors and employees will be on the double-check system, and jobbers' tickets will be issued under special arrangements. Regular single admission to the hall will be 75 cents, including war tax.

The show will open Saturday, March 12, at 2 p. m. and will be open every day thereafter, excepting Sunday, from 10 a. m. to 10:30 p. m., until and including Saturday, March 19.

This annual show is again for the 19th season under the competent management of Chester I. Campbell, and all the refinements and distinctively pleasing fea-

tures that have characterized the Boston event in the past will be in evidence at this time.

The exhibition is held under the combined auspices of the Boston Automobile Dealers' and the Boston Commercial Motor Vehicle associations. The directors of the former are: J. W. Bowman, J. S. Donovan, C. E. Fay, J. H. Johnson, F. A. Hinchcliffe, G. B. Kimball, J. H. MacAlman, J. W. Maguire, R. B. Nettleton, C. P. Rockwell and F. E. Wing, with J. H. MacAlman as president and F. A. Hinchcliffe as treasurer.

The directors of the Commercial Vehicle association are as follows: P. S. Aultman, E. Day Baker, W. H. Baker, J. S. Hathaway, N. H. Halliday, J. H. MacAlman, J. W. Maguire, C. P. Rockwell, L. B. Sanders. The officers are: President, J. S. Hathaway; vice president, J. W. McGuire; treasurer, E. Day Baker.

Chester I. Campbell is secretary of both bodies.

#### Outlook Is Most Encouraging.

"This is not the time to boast," says Manager Campbell, "but the extraordinary demand for space indicates that the entire motor industry is looking towards New England to give the first sign of returning prosperity. The dealers all over New England apparently have the same view, for hundreds of them have written in asking our organization to make hotel reservations for them. All of these signs indicate to me that 'show week' in Boston is going to attract a big crowd."

#### A Buyer's Show.

This is expected to be pre-eminently a buyers' show, as the New England territory is probably as alive to the growing possibilities of the use of the motor vehicle, both pleasure and commercial, as any section of the country, and the big Boston show is always the opening impetus in the selling campaign.

The motor truck department will have an unusually large and varied display. Every kind of body for commercial purposes, with the latest and most efficient methods of loading and unloading will be

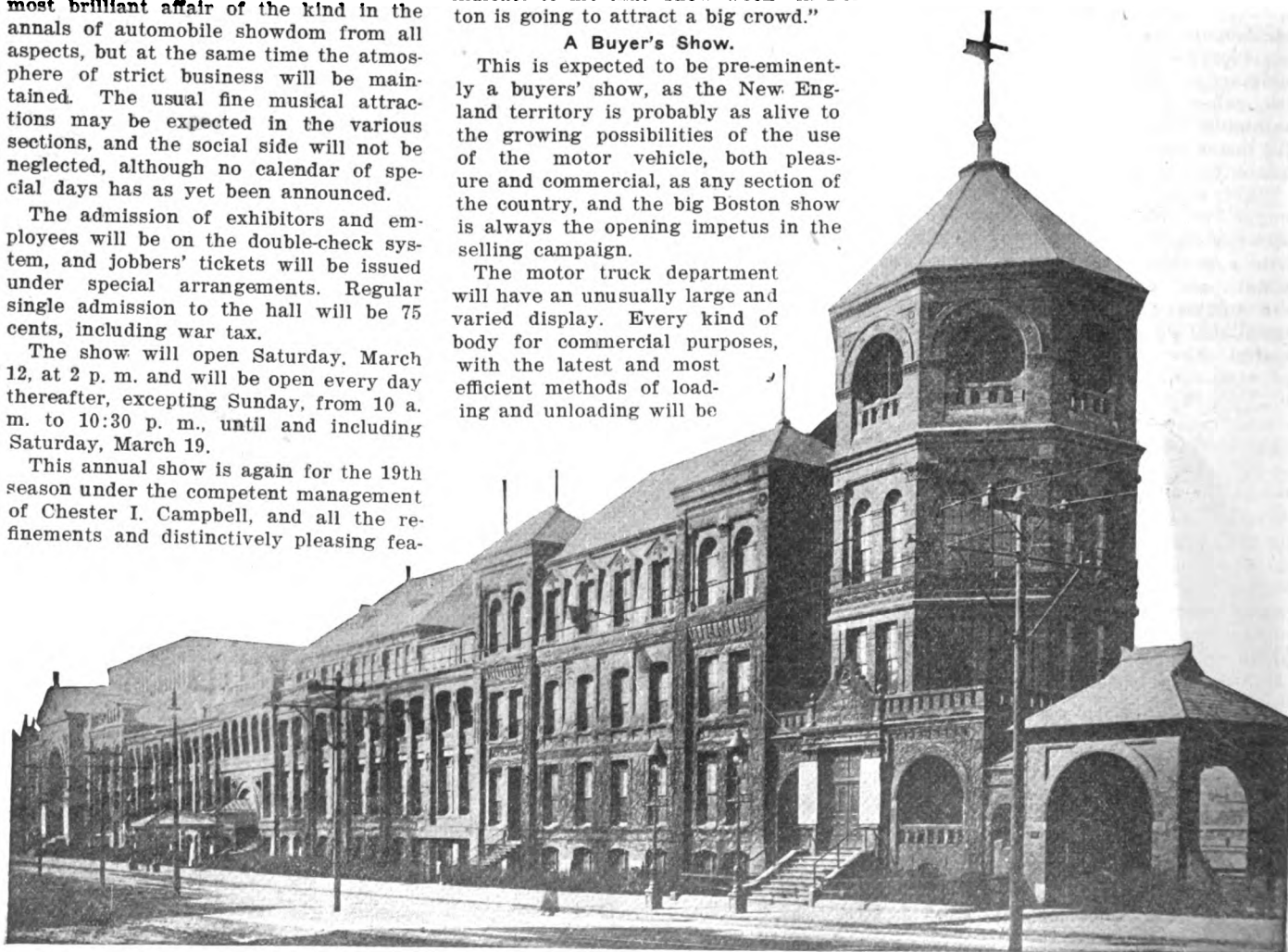
shown. This will be housed in the basement of the Mechanics' building, as has been the custom in the past. It is stated that it will easily be the largest commercial car show of the year held anywhere. For instance, more than twice as many models are scheduled to be seen as were at the exclusive New York truck show.

Many of the trucks will be shown completely equipped with bodies, pneumatic tires and every necessary accessory. The special bodies will comprise many for farm use, including the convertible type, some of which are designed to serve eight different purposes on a single chassis. In addition to the gasoline models a number of electric trucks will be shown.

The fact that the New England section is continually becoming more and more aware of the utility and adaptability of motor driven farm equipment is demonstrated by the fact that considerable space will be devoted to the showing of tractors and other agricultural appliances. There will also be a representation of trailers and semi-trailers.

#### Social Events of Show Week.

There are to be held during Show Week the usual number of conventions, conferences, banquets and other get-together events which contribute so largely to make Boston the mecca of all New England and eastern interests in the automotive field at this time. This section is ripe for the return of big business.



Huntington Avenue Front of Mechanics' Building Looking South, Where Boston Automobile Show Is Held.



## Business Revival Further Accentuated at Chicago Show

CONSIDERED from every viewpoint of the distributor and dealer, the Chicago National Automobile Show was an undoubted success. The spirit of optimism which was so gratifying at the prime event of the season in New York was even more in evidence at the western metropolis during the week of the motor vehicle exposition, Jan. 29-Feb. 5. At the close of the New York show, all eyes were turned towards Chicago with the feeling that at that time a closer estimate of the business for the coming year could be made. As a consequence, all the various automotive interests were more strongly in evidence than ever before. Material manufacturers were there in force and foundry, forge shop and mill representatives were lined up with the car manufacturers and dealers. The idea was to get at the status of the industry as well as to take actual orders. This resulted in the possibility of obtaining a more tangible indication of the manufacturing situation in the country as a whole than before since the present business complications started. And it is thus now conservatively estimated that the car manufacturing schedule of the principal concerns of the country will for the next three months average 60 per cent. of that for the same period of 1920, and that the total production should reach 1,300,000 cars for the present year. This is without taking into consideration some five of the larger manufacturers, who have internal complications in the way of the reorganization of finances or personnel to adjust or, because of a period of forced production, have an unusual large stock of cars in their distributors' hands.

### Show Exceeded Former Records.

This year the Chicago show exceeded its record in several respects. It has always been pre-eminently a business show, but this year there has been an unusual determination manifested in every branch of the industry represented. There was much constructive work all along the line, as everyone was disposed to get business no matter how hard it might be necessary to fight for it, and it was felt that the opening guns must be fired in the dealers' sales rooms.

While the actual retail sales were only about two-thirds of what they were a year ago, the big attendance and unusual number of live prospects which were developed justified this determined spirit of cooperation, as well as the feeling of optimism which was transmitted, together with the majority of the exhibits, from the earlier New York event. There was an unprecedented volume of selling a year ago, but conditions then were widely different from what they are today. This year the attitude of the buying public is manifestly changed. It presents a clientele of an investigating turn of mind which is not buying haphazardly, but wants to be shown and needs to be convinced.

Although weather conditions were un-

### COMPARISON OF CHICAGO AND N. Y. SHOWS.

#### NUMBER OF EXHIBITORS.

	Chicago	N. Y.
Gasoline Cars.....	77	83
Electrics .....	3	3
Accessories .....	195	221
Total.....	275	307

#### NUMBER OF CARS EXHIBITED.

Gasoline .....	371	324
Electric .....	6	7
Steam .....	1	1
Stripped Chassis.....	27	38
Four-Wheel Brake....	0	1
Total.....	305	381

#### BODY STYLES, OPEN CARS.

Roadsters, 2-3 Pas....	35	40
Touring, 4-5 Pas.....	79	91
Touring, 6-7 Pas.....	30	32
Total.....	144	163

#### BODY STYLES, CLOSED CARS.

Coupes, 2-3 Pas.....	38	23
Sedans, 4-5 Pas.....	60	80
Others, 6-7 Pas.....	29	27
Total.....	127	130

#### GASOLINE ENGINE TYPES.

Four-Cylinder .....	71	80
Six-Cylinder .....	166	213
Eight-Cylinder .....	27	31
Twelve-Cylinder .....	2	3
Air-Cooled .....	7	7
Water-Cooled .....	269	325
Tappet-Valve .....	271	321
Sleeve-Valve .....	10	12
Revolving Disc Valve	0	1
Valve-in-Head .....	77	119
L-Head .....	168	180
T-Head .....	12	29

#### WHEEL STYLES.

Wire .....	52	70
Disc .....	49	56
Artillery .....	165	215

favorable, the paid attendance was 18 or 20 per cent. better than last year, and after the first day practically all admissions were paid. The booths were so crowded during the middle days of the week that the selling organizations were forced to postpone all discussions of any length for continuation in the sales room later on. And those in attendance were not as a whole prompted by mere idle curiosity, but were conscientious in their interest and were essentially made up of car owners, present or prospective.

In estimating that the list of prospects is some 50 per cent. larger than last year, only those are considered who indicated their interest in the cars to the extent of leaving their names and addresses.

### Decorations Most Lavish.

The most lavish decorations in the 21 years of history of the Chicago automobile show converted the vast expo-

sition buildings into bowers of colorful beauty; 250 art glass shades, suspended from the lofty ceilings, cast a soft glow on the \$100,000,000 display of automobile creations. The various makes of cars were divided off by high pillared sections, crowned with vases of rare flowers.

Cameos along the gallery fronts depicted the evolution of transportation, from the ancient days of the cave man to the modern sight seeing buses.

More than 200 manufactures and dealers of accessories, devices and articles lending additional comfort, utility and economy to driving had displays in the galleries and basements.

Judged from an engineering and manufacturing standpoint, it may be said that no new cars appeared at the Chicago show. The three cars shown which are new to the general public, are all assembled products, incorporating units with which the industry is familiar. These new cars are the Winther Six put out by the manufacturers of the Winther truck, the Ambassador, which is a product of Shaw of Yellow Taxi fame, and the third is the Sterling Knight, of which the initial product was exhibited at the salon and for which there are as yet no factory or manufacturing plans. The car is the design of Engineer Sterling, formerly of the B. F. Stearns Co.

The usual automobile salon which specializes in the offerings of foreign countries, together with some of the more unusual special high-class designs of American makers, was held at Hotel Drake, and included 14 makers, showing 43 cars. This was well attended and a highly satisfactory volume of business was reported.

### DEALER'S CONTRACT DISCUSSED.

One of the principal features of the various conventions and get-together meetings that were, as usual, held during Show Week, was the annual meeting of the National Automobile Dealers' Association, in the course of which was discussed the much-mooted question of contract relations with manufacturers.

This discussion was prefaced by a letter to Manager Harry G. Moock of the N. A. D. A. from C. W. Nash of the Nash Motors Co., in which he set forth his ideas of dealer-factory relations. Following this Robert J. Schmunk, vice president and general sales manager of the Peerless Motor Car Co., appeared in person before the association and outlined his ideas as to what the attitude of the factory toward the dealer should be. Following these messages from leading manufacturers, the meeting was thrown open for discussion, terminating in the authorization of a committee and the invitation to the manufacturers to cooperate.

With the entire trade and industry made aware of all the facts in the case, it is believed the matter will work itself out almost automatically.

## New Premocar Special and Magic Six Models

**T**HE Preston Motors Corporation of Birmingham, Ala., manufacturer of the Premocar, is offering two five-passenger models for its 1921 line, the Magic Six and the Premocar Special, the latter being equipped with a four-cylinder Rochester-Duesenberg motor. Both cars have a wheelbase of 117 inches and both conform to the same general design, which embodies all that the dictates of good taste demand without being freakish.

The general specifications call for a Stewart vacuum feed from tank in rear, Zenith carburetor, Connecticut ignition, Dyneto lighting and starting, Borg & Beck clutch, Muncie unit gearset, Timken-Detroit floating axle, Dittwiler steering gear, Klaxon horn, Willard battery and Firestone tires.

The special comes equipped with disc or wire wheel and has Firestone cords. The castings in the special are of bronze instead of malleable in the Magic Six, the frame being reenforced to accommodate the heavier motor. The frame on

the Special at \$3865, f. o. b. Birmingham. The detailed specifications for each follow:

### PREMOCAR MAGIC SIX.

#### Model 6-40 A.

**Engine**—Falls, 3½-inch bore, 4¼-inch stroke, six cylinder, latest type overhead valve enclosed motor, helical gear camshaft drive.

**Cooling**—Thermo-syphon or natural. Service fan used.

**Radiator**—Own make, designed to obtain maximum efficiency from motor. Latest design straight front baked enamel case used.

**Lubrication**—Force feed and splash.

**Fuel Feed**—Stewart vacuum feed from 15-gallon tank in rear.

**Carburetor**—Zenith, especially adapted for use on this motor.

**Ignition**—Connecticut, the new "toggle switch" being used on instrument board. Supplied with automatic cut-out switch.

**Lighting**—Dyneto. Large double bulb headlights of special design.

**Starting**—Dyneto double-unit starter and generator.

**Clutch**—Borg & Beck, 10 inches multiple disc.

**Gearset**—Muncie unit gearset. Three

**Radiator**—Own design, equipped with motometer. Vertical shutters encased in front end of shell and operated from dash, so temperature of engine may be regulated at all times.

**Lubrication**—Force and splash feed. Crankshaft bearings lubricated by force feed through hollow crankshaft.

**Carburetor**—Zenith.

**Fuel Feed**—Stewart vacuum tank.

**Ignition**—Latest type Bosch magneto with vertical distributor.

**Starting and Lighting**—Westinghouse system. Extra large headlights with frosted dimmer lights selected for both service and beauty. Cowl equipped with bullet lights; parking light on left rear fender. Starting motor operated by push button on dash.

**Transmission and Clutch**—Warner, unit power plant type. Three speeds forward and one reverse.

**Propeller Shaft**—"Universal" make, two-joint type of ample strength.

**Axles**—Timken-Detroit, equipped with Timken bearings throughout. Extra heavy full floating rear axle, 4.9 to one ratio, equipped with torque arm to take driving strain.

**Springs**—Alloy steel, oil tempered, semi-elliptic type, suspended by drop forged shackles and equipped with hardened spring bolts and oil cups. Front springs, 2¼ inches wide; rear, 2½ inches wide; 56 inches long. Gabriel shock absorbers.

**Wheelbase**—117 inches, wire, wood or disc wheels.

**Tires**—32x4½. Firestone cord.

**Steering Gear**—Warner extra heavy with sliding lock hand wheel.

**Frame**—Specially heat treated channel section; 7¼ inches deep, 162 inches long, reinforced by five cross members.

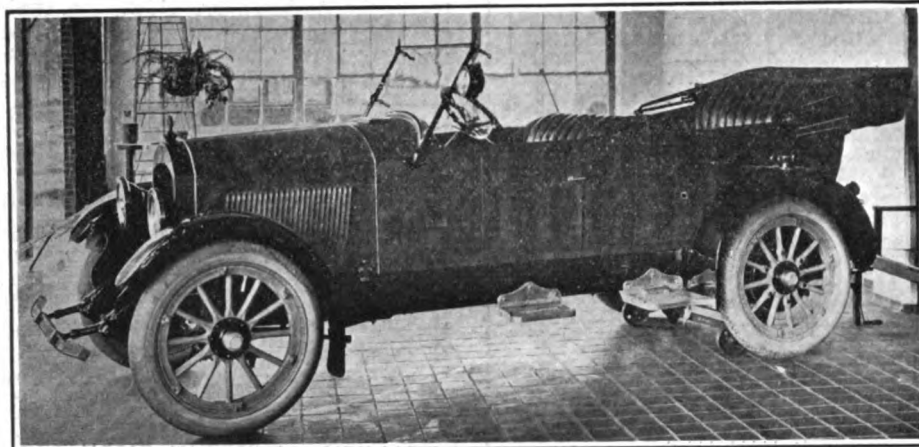
**Horn**—Klaxon.

**Battery**—Willard six-volt.

**Equipment**—Stewart speedometer, choke, ammeter, oil gauge, trouble light, cigar lighter and eight-day clock on instrument board.

**Body**—Manufactured in our own shop by skilled workmen; beveled edge, streamline design, embodying latest engineering practise and finished to the minutest detail.

**Price**—\$3865, f. o. b. Birmingham, Ala. Fabricord outside or "craftsman" finish, \$150 net, extra. California top, \$150 net extra.



New Premocar Magic Six Model Manufactured by the Preston Motors Corporation, Birmingham, Ala.

both models is a special, heat treated 7¼-inch channel steel construction. The Magic Six has a Falls motor of 3½-inch bore by 4¼-inch stroke.

Good results are stated to have been obtained on stock and California top jobs by the use of fabrikoid coverings, which is one of the distinctive features of Premocar construction, and lends itself well to various unique finishes. Among these reported to have been ordered by individual customers in the respective states are the Georgia "Peach," the Florida "Orange" and the Alabama "Alligator." This finish is said to be like the alligator's hide in its quality of durability and clinging tendencies, and is especially popular along the Gulf and South Atlantic sections where the salt air penetrates the varnish and tends to rust the metal body of the car.

Although Premocar production is at present restricted to the models mentioned herewith, it is understood that plans are being made for the addition of roadster and closed models to the line. The Magic Six is priced at \$1295 and

speeds forward and one reverse.

**Propeller Shaft**—"Universal" make. Two-jointed Hotchkiss drive.

**Rear Axle**—Timken-Detroit semi-floating type.

**Springs**—Semi-elliptic; rear springs, 56 inches in length.

**Wheelbase**—117 inches. Wood wheels.

**Disc Wheels**—Net extra, \$75.

**Wire Wheels**—Net extra, \$75.

**Tires**—Firestone, 32x3½. Firestone type E rims.

**Steering Gear**—Dittwiler.

**Horn**—Klaxon.

**Speedometer**—Stewart.

**Battery**—Willard six-volt storage.

**Frame**—Specially heat treated, 7¼-inch channel steel.

**Body**—Made in own shops. Each joint is mortised, glued and screwed, being further braced by a liberal supply of forged bracing irons.

**Price**—\$1295, f. o. b. factory, Birmingham, Ala.

### "PREMOCAR" SPECIAL DUESENBERG.

#### Model 4-80.

**Engine**—Rochester Duesenberg motor, four-inch cylinder, four-inch bore, six-inch stroke.

**Cooling**—Gear driven water pump, case cast integral with crank case. Four-blade cast aluminum fan.

### AMERICAN ROAD BUILDERS' ASSOCIATION.

The American Road Builders' association, which includes in its membership the highway and street officials, engineers and contractors, together with the manufacturers of road machinery, materials and transportation equipment throughout the United States and Canada, announces that the 18th annual convention, 11th American Good Roads Congress and 12th National Good Roads will be held in the Coliseum, Chicago, Feb. 9 to 12.

More than 40,000 square feet of floor space in Chicago's big exposition hall will be devoted to the exhibits, which this year, owing to the tremendous increase in road building and street improvement work since the close of the war, promise to exceed in number and variety those of the expositions held at Boston, Pittsburgh and Chicago before the war. The interest manifested in the coming exposition is reported as unusual.

Many new types of road building machinery and transportation equipment will be shown and demonstrated.

## Straight Eight Engine Feature of New Duesenberg Car

A HIGH efficiency, single-block, eight-cylinder engine, well designed chassis and hydraulically operated four-wheel brakes are the outstanding features of the Duesenberg Straight Eight, recently brought out by the Duesenberg Automobile & Motors Co., Inc., and on which quantity production will start at its Indianapolis factory early in March or April.

The new car was developed by the Duesenberg brothers, the well known designers of racing cars, and they have been working on it ever since the end of the war, the aim being the production of a chassis, with a 134-inch wheelbase, embodying all the speed and flexibility that could be used to advantage in everyday driving and yet would prove economical to operate.

With a bore of 2 $\frac{3}{4}$  inches and a stroke of five, the eight-cylinder engine is as compact as most sixes, the overall length of the cylinder block being only 30 inches. Its moderate piston displacement, 250 cubic inches, and its unusual high speed capabilities assure maximum power output with minimum fuel consumption. Reduction of all unsprung weight, preventing the road wheels from slipping and bouncing, and the use of liberal size cord tires contribute to longer tire service.

### Braking System Unique.

The braking system employed on the new Duesenberg is particularly interesting. There is a 15-inch brake drum on every wheel, each expanding service brake shoe being controlled by pedal in the customary way, but through an ingenious hydraulic arrangement instead of the conventional linkage.

All eight cylinders and the top part of the crankcase are cast in a single block, the cylinder head being a separate iron casting and the lower half of the crankcase an aluminum casting. Owing to the very satisfactory results obtained with the racing engines, which have inclined valves in the head, operated from an overhead camshaft, it has been decided to adopt this construction in the stock cars. The exhaust valves are made of cobalt chrome steel, and the inlet valves of low percentage tungsten steel. Double springs are used on both sets of valves. The overhead camshaft is driven through a vertical shaft, with helical gears at top and bottom, the vertical shaft running at crankshaft speed. Both members of the upper set of gears are mounted in the cylinder head. Thus when the cylinder head is removed the two upper bevel gears come off with it, the driving gears slipping over the top end of the vertical shaft. This makes it impossible, in taking the engine apart and reassembling it, to get the valve drive together wrong.

The entire valve drive at the front end of the engine is encased in an aluminum housing. A drive for the generator is taken off from the vertical shaft at about mid height by helical gears, and a drive for the combined water pump and oil pump off the crankshaft pinion by an ex-

tra bevel gear, mounted on a horizontal shaft.

The Delco electric system is used, with the distributor mounted on the generator. The starter is mounted on the flywheel housing the usual manner. Lubrication is by the pressure system, the gear type of oil pump being located at the forward end of the engine. A three-bearing crankshaft is used, consisting substantially of two four-throw cranks joined end to end and at right angles. To eliminate periodic vibration the crankshaft is made comparatively heavy, 2 $\frac{3}{4}$  inches in diameter on the main journals and 2 $\frac{1}{2}$  on the crankpins. Balance weights are also provided.

Either aluminum or cast iron pistons will be furnished as desired and pistons and connecting rods are made as light as possible. The piston pin has its bearings in the piston bosses.

The connecting rods are of chrome nickel steel and are tubular. The crankpin bearing bushings are soldered into

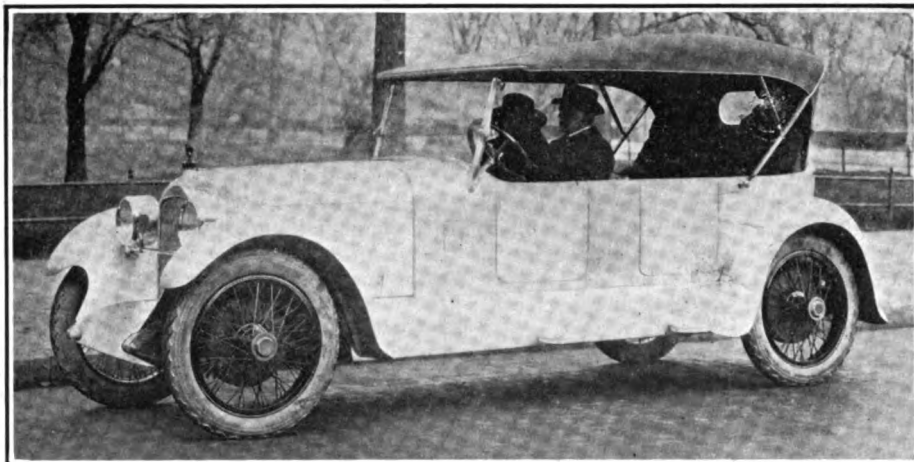
shafts. A tubular front axle is employed, constructed of chrome nickel steel, with a wall thickness of  $\frac{1}{8}$  inch. The steering knuckles and axle ends are drop forgings and are somewhat unusual in design, as the main member of the axle is tubular, and provision has to be made for supporting the brakes and conveying the oil to the brake cylinder.

The frame is light, yet strong, both side and cross members being of  $\frac{1}{2}$ -inch chrome nickel steel. There is one very deep cross member at the middle of the frame, to which the forward end of the propeller shaft housing connects.

The fuel tank, which is welded pressed steel, is located at the rear of the chassis, and fuel feed is by the vacuum system.

### Wheelbase, Body Design, Etc.

A wheelbase of 134 inches emphasizes the easy riding qualities of the Duesenberg Straight Eight chassis and permits of mounting comfortable, roomy bodies. The car is low hung and very



New Duesenberg Straight Eight Touring Car to Be Marketed by Duesenberg Automobile & Motors Co., Indianapolis, Ind.

the connecting rod head and cap, in order to obtain heat conductivity between bushing and rod.

The engine is suspended from three points, two supporting arms being cast integral with the flywheel housing, which set on pressed steel brackets riveted to the frame side members, and a third support at the forward end. The engine, clutch and change speed gear are combined into a unit power plant. The selective sliding gearset provides three speeds forward and reverse, and is fitted with a centrally located ball handled control lever. A double flexible disc universal joint forms the connecting link between the tail shaft of the transmission and the propeller shaft. Each of the two joints comprises two 7 $\frac{1}{2}$ -inch discs.

Every endeavor was made to cut out all unnecessary weight in designing the axle so as to get the lightest possible unsprung parts consistent with the length necessary for safety. Thus the axle shafts are made of chrome nickel steel and drilled out. The rear brake drums are secured directly to the axle

sports in appearance, yet its minimum road clearance is 9 $\frac{3}{4}$  inches.

When fitted with a four or five-passenger aluminum body the car weighs about 3100 pounds. Aluminum parts are used wherever practical, this construction including the radiator shell, dash and foot board. The fender irons, which also support the headlights, are of sheet steel. The bodies are of straight line, streamline design, with well rounded fenders and doors of ample width. The windshield and top are low and the steering column is set at a rakish angle. Individual steps may be had in place of conventional running board if desired.

Rudge-Whitworth wire wheels are standard equipment, with 33 by 4 $\frac{1}{2}$ -inch oversize cord tires and 80-milimeter hubs.

While price was not considered when the car was designed, the aim was to make it about \$6000. The extremely high quality of material and workmanship may, however, make it necessary to increase this. However no quality will be sacrificed to meet any definite price.

## Ace Car Incorporates New Departure in Engine Construction

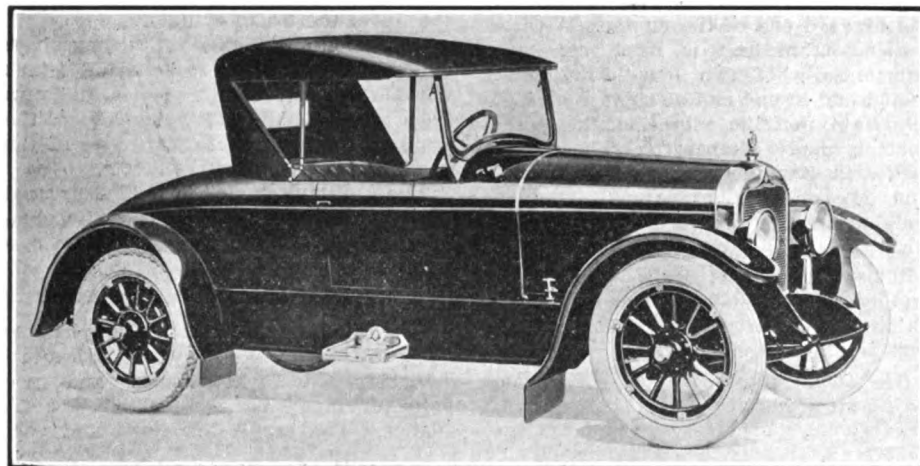
**T**HE Apex Motor Corporation, Ypsilanti, Mich., is embodying a new departure in engine construction in the new Ace car. This is the Guy disc valve motor stated to be the result of 10

film, and inasmuch as there is practically no friction in this wiping action, it is to be presumed that the valve will never wear out during the life of the motor. Each disc is prevented from

rounded generously and with the slightest trace of insweep in its sides. This insweep is carried along the length of the body to the rear, where it breaks into an unusually graceful back. Where the insweep breaks into the outswEEP curve there is a moulding fitted along the sides of the car adding to the yacht-like appearance of the body. The combination of the length, the slight insweep and the more pronounced outswEEP at the top gives the car an appearance of extraordinary length and lowness for this wheelbase. The car is heavily fendered, but without running boards, graceful steps for compartments taking their place. The splash shield of the body is carried low to add still more to the yacht appearance.

The Ace car is offered in touring, roadster, brougham and sedan models. The closed cars retain the low hung appearance of the open cars. The balance has been so carefully worked out that the characteristic rolling and sidesway of these types is entirely eliminated. This is accomplished by keeping the center of weight practically as low in the closed cars as in the open cars. These closed cars are handsome in appointment and complete in every detail. The interiors of all models are designed primarily for the utmost riding ease. The cushions are long and with a comfortable reclining slant. Leg room is such that passengers can stretch out in loafing ease.

Several color varieties are offered, one of the most striking effects being found in the brougham where two colors are used. The fenders, splash apron and insweep portion of the body side up to the mouldings are carried out in black. The portion above the moulding, including the cab, is finished in Ace green, a combination which is entrancing in this particular type.



Ace Six Two-Passenger Roadster, Made by Apex Motor Corporation, Ypsilanti, Mich.

years experimental work on the part of Fred M. Guy, vice president and chief engineer of the company. Eighteen months ago the first motor, a four, had been brought to a state of perfection which was reported to mark a revolutionary advancement in valve construction. Since that time the entire concentration of the engineering force has been directed on a new six, which is now perfected and ready.

The Ace valves are a series of discs, one in the combustion chamber of each cylinder. These discs are geared together in chain from a master gear driven from the crankshaft by a worm gear. Each disc operates at one-eighth crankshaft speed and contains four slots cut in the form of a V from the periphery to the hub of the disc. These V shaped slots, in the process of rotation of the disc, pass over ports which enter into the intake and exhaust manifolds of the motor. On the intake stroke of the motor four slots in the disc register with four ports in the cylinder, thus communicating with the intake manifold. On the exhaust stroke the same thing takes place. This gives a wide open manifold opening by a perfectly mechanical movement which means that the intake of gases and the scavenging of the cylinders is accomplished perfectly at any speed. There is also no opportunity for lag or chatter of the valve springs at high speed. Also, due to the perfect handling of gases coming into and leaving the cylinders, a very high torque at low speeds is created, giving the engine unusual pulling ability.

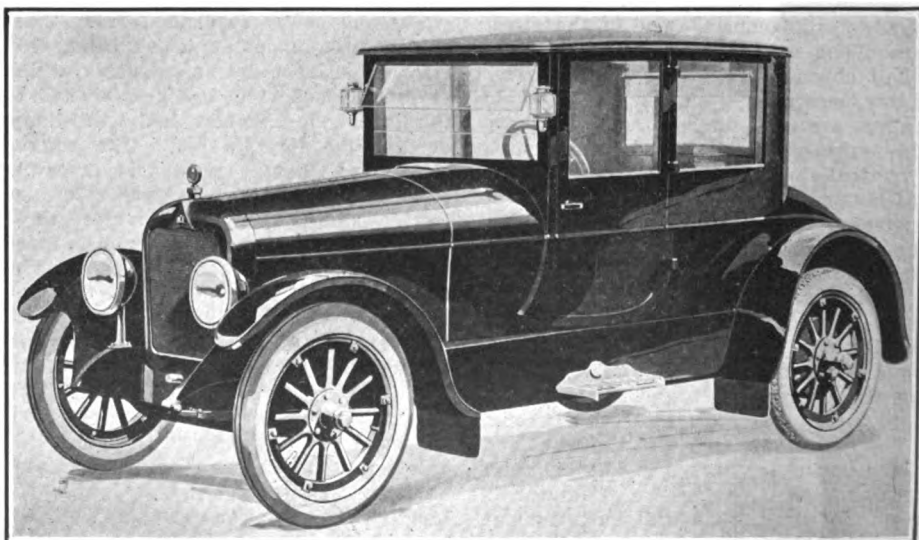
### Valves Do Not Carbonize.

Another feature of note is the fact that these valves never carbonize and never need grinding. The rotation of the valve gives a wiping action on an oil

chattering on the suction stroke by a compression spring. This spring in turn has its tension offset by a thrust bearing, thus keeping the disc on an even seat, yet reducing friction to the minimum. The valve itself is held to its driving shaft by a universal action which takes up any possible misalignment. Yet another feature is the fact that this motor has only seven valve parts in each cylinder as compared to from 14 to 18 in the poppet valve type. It is stated that careful tests prove that friction power loss with this motor is about one-half that with the ordinary poppet valve.

### Other Features of Ace Construction.

Passing to other features of the new Ace car, it is stated that it conforms, line by line, with the very latest ideas in body design. Starting at the front, the Ace is fitted with a massive radiator,



Four-Passenger Brougham Is Another Attractive Member of Ace Six Line, Which Is Equipped with Guy Disc Valve Motor.



# HUMOROUS SIDE OF MOTORING

## TRAFFIC CODE FOR PEDESTRIANS.

1—Pedestrians crossing boulevards at night shall wear a white light in front and a red light in the rear.

2—Before turning to the right or the left the pedestrian shall give three short blasts on a horn at least three inches in diameter.

3—When an inexperienced driver is made nervous by a pedestrian he shall indicate the same and the pedestrian shall hide behind a tree until the automobile has passed.

4—Pedestrians shall not carry in their pockets any substances which when broken will be apt to cut automobile tires.

5—In dodging automobiles pedestrians shall not run more than seven miles an hour.

6—Pedestrians must register at the beginning of each year and pay a license fee of \$5.

7—Pedestrians will not be allowed to emit cigarette smoke on any boulevard in an offensive and unnecessary manner.

8—Each pedestrian, before receiving his license to walk upon a boulevard, must demonstrate before an examining board his skill in dodging, leaping, crawling and extricating himself from machinery.

9—Pedestrians will be held responsible for all damage done to automobiles or their occupants in collision.—National Safety News.

## PUTTING IT THROUGH ITS PACES.

From the barnyard came the raucous roar of the farmer:

"Whoa there! Giddap! Gee, haw, Whoa! Steady! Whoa! Giddap! Gee! Haw."

"Somebody having trouble with the cattle?" inquired the city visitor.

"No, sir," said the girl with the pail.

"That's paw. He's just bought a flivver an' he's tryin' t' teach it how t' steer."—Richmond Times-Dispatch.

## THOUGHT THEM CARS.

"The man was in a reverie and the lady was in a tantrum. They collided."

"The man was in what?"

"A reverie. And the lady was in a tantrum."

"I suppose both machines were badly damaged?"—Louisville Courier Journal.

## NO FAIRY TO THIS.

First Motorist: Have you a little fairy in your home?

Second Motorist: No; but I have a little miss in my engine.

## AIDS IN PRONUNCIATION.

This lesson is for Letty Lour  
Who says "detour" to rhyme with "hour;"  
And worse than that, O mercy me,  
She puts the accent on the "de."  
—Youngstown Telegram.

And this is for Miss Hudson Stutz,  
A relative of hers by marriage;  
When she comes home she always shuts  
Her ottomobile in the garrridge.  
—Cleveland Plain Dealer.

And this for Mrs. Lizzie Fliv,  
The well known "Women's Rights" debater,  
When in a rush to cast her vote,  
She steps on the "exhilarator."

## BALM IN TIME OF TROUBLE.

'Smatter? Got a puncture?  
Maybe you're outa gas.  
Tried your spark plugs yet, Mister?  
Le's all push 'er over th' hill an' maybe she'll start on compression.  
I had one o' them things once, but I traded it for a wheelbarrow.  
Whyn't yuh git a self-starter, huh?  
Need 'ny help?  
If you're insured, whyn't yuh leave it in th' road?—Richmond Times Dispatch.

## HINT TO THE "TROUBLE SHOOTER."

Ray Prince of Salisbury, N. H., having trouble in starting his automobile drove to Franklin garage today. In the carburetor workmen found a handful of acorns, squirrels evidently having crawled through the air intake and used the carburetor for storing winter food.

## NO SUCH ANIMAL.

A prospective buyer walked into a garage and said to the proprietor: "I would like to see a first class second hand car."

The proprietor looked at him and smiled as he replied: "So would I, brother."

## UTILIZING THE CONTRABAND.

Chief Buckley of the Ware, Mass., police force owns an automobile and has solved the problem of disposing of the illicit wet goods captured and condemned by his department by putting it into his radiator as an anti-freezing compound.

## DIDN'T NEED THAWING OUT.

In the good, old-fashioned days you could start old Dobbin on a frosty morning without pouring a kettle of hot water on his carburetor.—Baltimore Sun.

## THEN AND NOW.

The old-time rube who was given to blowing out the gas now has a son who steps on it.—Nashville Banner.

## IN BOSTON, OF COURSE.

"Fare!"

The passenger paid no attention to the bus conductor's war yell.

"Fare, please!"

Still the passenger was oblivious.

"By the ejaculation term 'Fare!'" said the conductor, "I imply no reference to the state of the weather, the complexion of the beautiful damsel you observe in the contiguous seat, nor even to the quality of the service vouchsafed by this philanthropic company. I merely allude, in a manner perhaps lacking in delicacy, but not in conciseness, to the monetary obligation incurred by your presence in this car, and suggest that you liquidate."—Boston Globe.

## SUCH IS FAME.

A corpulent negro woman called on Judge McNamara of the Memphis, Tenn., police court.

"Henry Fo'd kicked me," she explained.

"See a garage," he extenuated.

"He ain't a auto; he's mah hubby," she elucidated.

"What's your name?" he inquired.

"Mah name's Lizzie. They call me 'Tin,'" she identified.—Honk-Honk.

## TWO LICENSES REQUIRED.

"It's got so these days that a man can hardly wed unless he can show the girl two licenses."

"Two licenses?"

"Yes; marriage and automobile."—New Haven Register.

## GRAMMAR A LA MODE.

Teacher—Don't you know that punctuation means that you must pause?

Willie—'Course I do! An auto driver punctuated his tire in front of our house yesterday and he paused for half an hour.—Philadelphia North American.

## CHANCE FOR THE CHARITABLE.

Price of cement down 30 cents a barrel. Going to Build?—Boston Globe.

We might consider building a garage if somebody would donate a car to keep in it.—Brockton Enterprise.

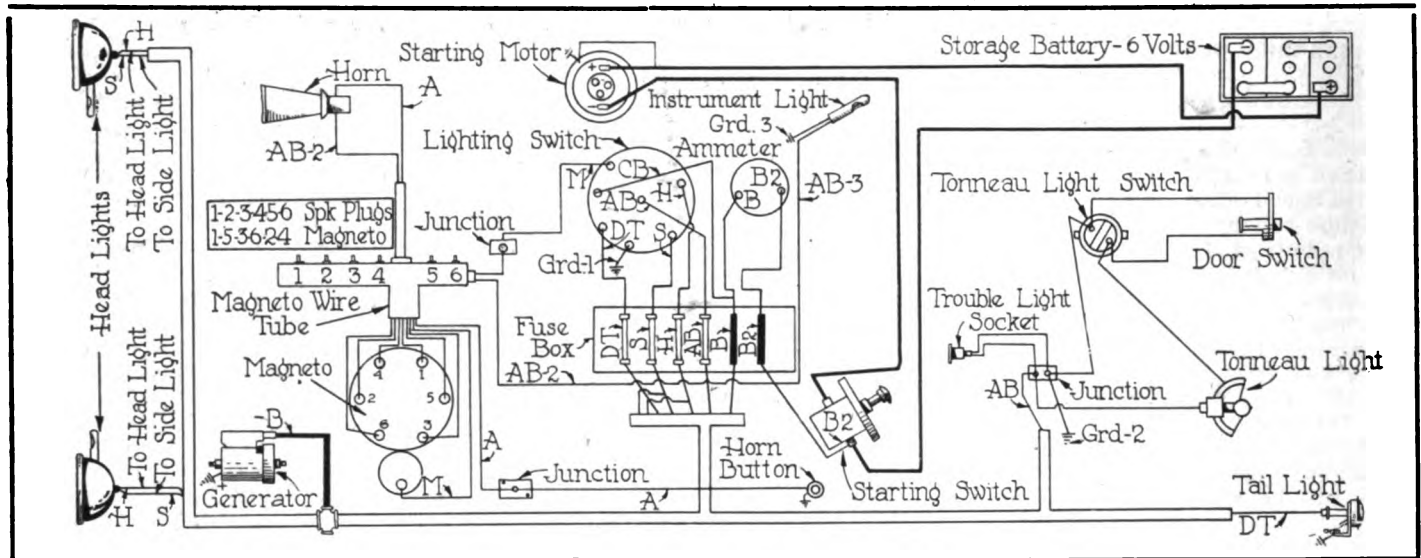
## IN LINE WITH HENRY'S LATEST.

Wanted—Married man to milk and drive Ford. Write F. J. B., 721.—Passing Show of the Columbus Dispatch.

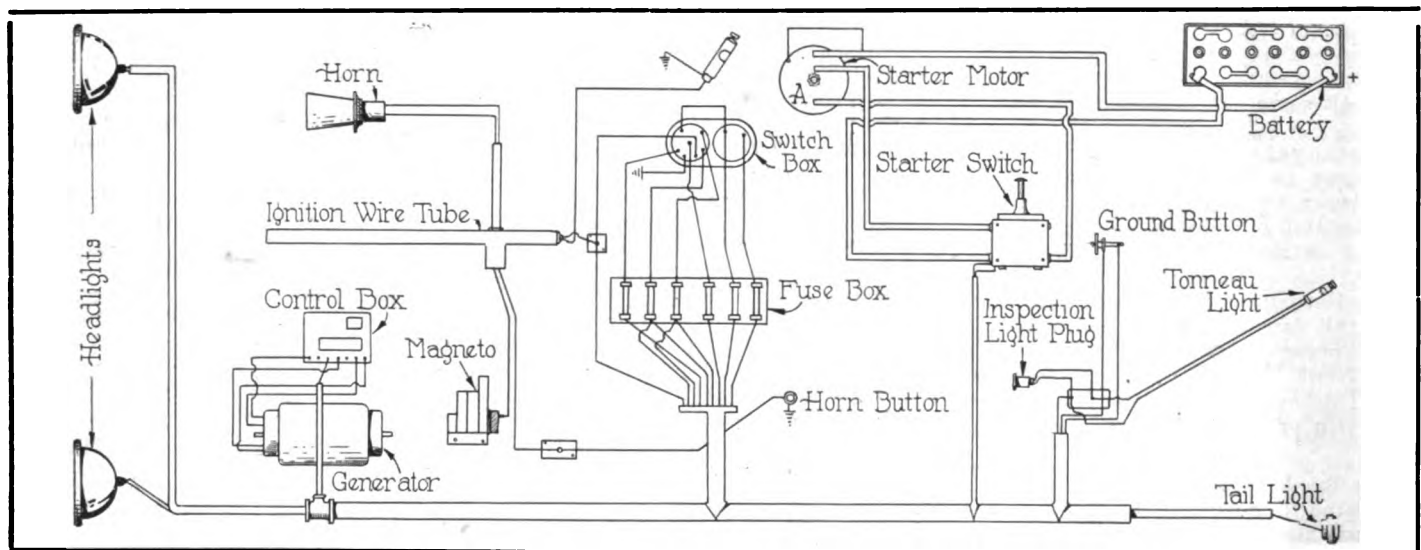
## INVIDIOUS COMPARISON.

Some wives say that some husbands act like motors; as soon as they stop sparking they begin to knock.

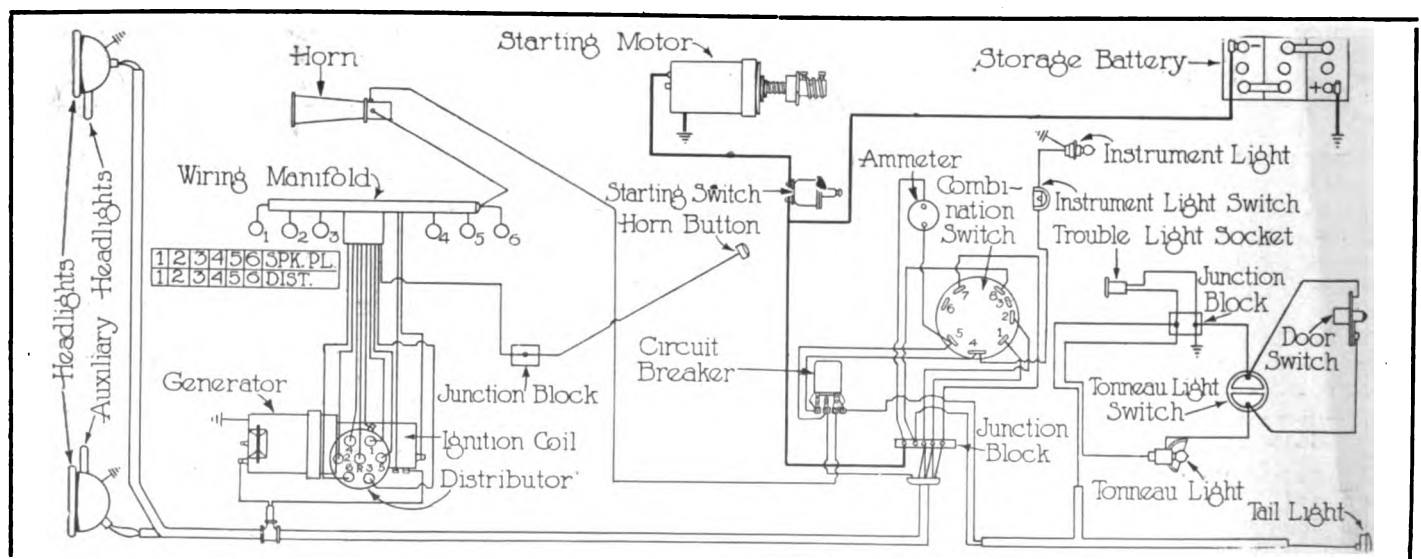
# Monthly Wiring Diagram, No. 12



Marmon Model 34, 1918, High Tension Magneto, Delco Starting and Lighting.



Marmon 1918, Bosch Starting, Lighting and Ignition.



Marmon Model 34, 1920 Delco Two-Unit System, for Starting, Lighting and Ignition.

# NOTES OF INDUSTRY AND TRADE



Factory of Cleveland Automobile Co., Now Being Built in Cleveland, O.; Estimated Capacity, 40,000 Cars a Year.

## New Officials of Dodge Bros. Co.

The recent announcement of the election of Frederick J. Haynes as president and general manager of Dodge Brothers, Detroit, to succeed the late Horace E. Dodge, is followed by the selection of a complete board of new executives and directors.

Arthur T. Waterfall is made vice president and assistant general manager, Harry V. Popeney, secretary, and Reginald J. Fry, assistant secretary. Charles W. Matheson has been advanced to the position of general sales manager. Howard B. Bloomer is made chairman of the new board of directors. The other directors are Frederick J. Haynes, Arthur T. Waterfall and John Ballantyne.

Mr. Haynes' association with the two Dodge brothers covers a period of over 21 years. During this time he was not only chief executive of their great business, but was also a close personal friend. By reason of this long association there is no one more familiar with their aims and principles or more admirably qualified to carry on their work. Immediately after the death of Mr. John Dodge a year ago, Mr. Haynes was elected vice president and general manager, and has been the active head of the business during the illness of the late Horace E. Dodge. It was Mr. Dodge's request, just before his death, that Mr. Haynes be elected to the presidency of the institution.

Mr. Waterfall was for many years superintendent of the Russell Wheel and Foundry Co. of Detroit, and later vice president and director of traffic for the Detroit Board of Commerce.

Mr. Popeney joined Dodge Brothers about 10 years ago, and since that time has occupied various positions of responsibility. For some years he was assistant to the former secretary of the company.

Mr. Fry's association with Dodge brothers dates back to 1910, and he, too, has developed with the company. In recent years he has occupied positions as auditor and office manager.

Charles W. Matheson, who now takes the position of general sales manager,

has been associated with Dodge Brothers' sales department since they first started to manufacture a car of their own. He first acted as New York district representative and later as director of service at the factory. Since the resignation of the former sales manager he has been the acting head of Dodge Brothers' sales department. Mr. Matheson has been connected with the industry since the inception of it, and was for 12 years a manufacturer of one of the high priced cars.

Mr. Bloomer, chairman of the board of directors, was for many years the close personal friend and legal advisor of both John and Horace Dodge. He has been a member of the board since the reorganization which followed the death of John F. Dodge last January. He is a prominent Detroit attorney.

Shortly before Horace Dodge's death, John Ballantyne was elected to the board of directors. He is president of the Merchants National bank of Detroit. For a great many years he has been a close personal friend and confidential advisor to Horace Dodge.

## DETROIT CONSOLIDATED SALES CO.

The Detroit Consolidated Sales Co., Inc., has been organized, with offices at 2631 Woodward avenue, Detroit, Mich., by E. H. Herman, C. H. Hinckley, J. F.

Nebrick and W. G. Sparling, to act as selling agents for manufacturers of equipment for the automotive trade.

This firm will operate in Minnesota, Iowa, Missouri, Arkansas, Louisiana and all the territory east thereof to the coast. It is officered by former members of the Universal Tool Co. and in addition to the products of that firm it will distribute exclusively to the jobbing trade other products made by the Electric Machine Co., Indianapolis, Ind., and the Federal Screw Works, Detroit.

## ALLEN ISSUES "OPTIMIST" NUMBER.

The January number of the Bull's Eye, the house organ of the Allen Motor Co., Columbus, O., is devoted to the cause of optimism in business and is doing its part towards spreading the gospel of the "Silver Lining" so much needed at the present time. The editor, F. I. Lackens, is showing himself to be a successful propagandist of good cheer.

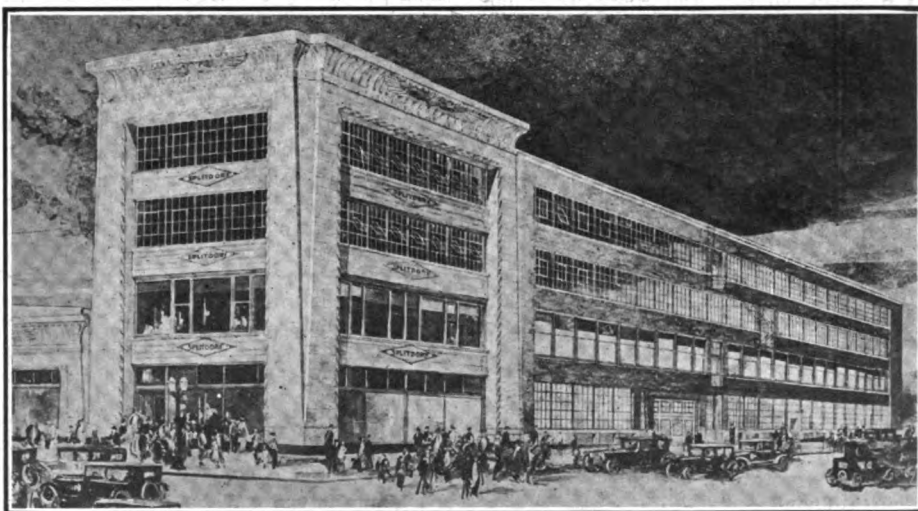
## PREMOCAR DISTRIBUTORS.

The Preston Motors Corporation, Birmingham, Ala., maker of the Premocar, announces that the Creel Motors Co. of Birmingham has taken over the district agency for the Premocar.

The Alabama Motors Co. also recently assumed the management of the Premocar agency at Gadsden, Ala., under the immediate supervision of S. W. Miles.

## ANNUAL MEETING U. S. CHAMBER OF COMMERCE.

Joseph H. Defrees, president of the Chamber of Commerce of the United States, has announced that the ninth annual meeting of that body will be held at Atlantic City, N. J., April 27-29. Last year's meeting was also held at Atlantic City.



New Service and Sales Building of Splitdorf Electrical Co. Recently Opened at Chicago.

## Reorganization of Maxwell-Chalmers

The reorganization plan of the Maxwell-Chalmers Motor Co., which has been under consideration for some time, has been declared operative as originally formulated by the managing and reorganization committee headed by Walter P. Chrysler and J. R. Harbeck. This assures an additional capital of \$15,000,000 and puts the company under powerful management with a new and strong organization. More than 87 per cent. of the outstanding stock of the two companies has been deposited under the plan, but the committee is extending until Feb. 1 the time under which deposits of stock and unsecured claims can be made without penalty.

It is stated by Mr. Harbeck of the reorganization committee that "the new company is now placed in an extremely fortunate position to face the conditions confronting the automobile industry. The net outstanding obligations of the Maxwell and Chalmers companies have been reduced, through liquidation, by approximately \$11,000,000.

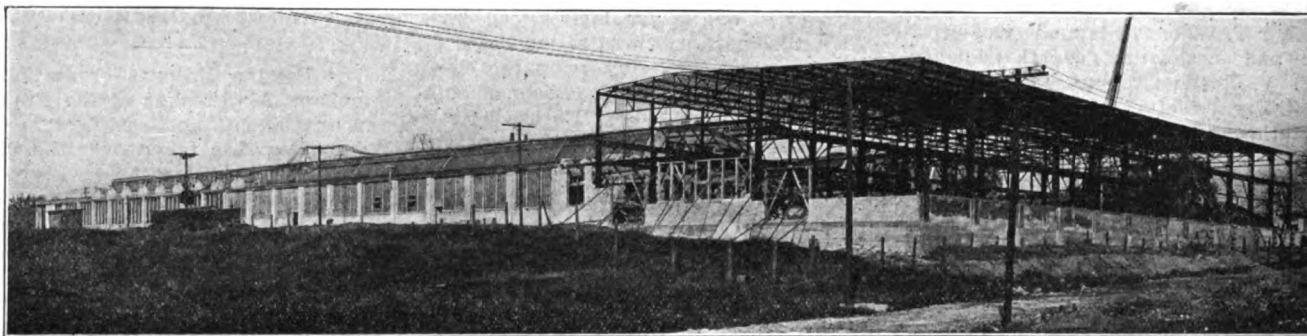
complete family of Lox-On air hose chucks. This comprised the model AA for all standard hose couplings, model B in a fluted stem solid cast body design, especially adapted to manufacturers' standard factory equipment purposes; model C, a solid bronze chuck with an overhead acting lever engaged and released by a simple easy pressure of the thumb up or down and intended for use in the case of pumps or air compressors not having a tank or air reservoir, and the Lox-On Junior model chuck, a neat, little heavy pressed steel body hose connection with a solid brass piston and engaged to the valve stem by bringing the thumb and index finger together and released by reversing the operation. This latter has been adopted as standard factory equipment by 14 prominent manufacturers of foot pumps and light portable garage equipment.

The Automatic Safety Tire Valve Corporation has also announced that the Converse Rubber Shoe Co., Tire Division, Malden, Mass., has adopted the Whistler, the automatic pressure regulator manufactured by the Automatic Corporation, as standard factory equipment on the Converse heavy duty inner tubes.

## Ford Affairs Still in the Lime Light

While the affairs of the Ford Motor company continue to be one of the principal matters of interest in the automotive industry, certain sensational financial features which were given a considerable amount of publicity the latter part of the month were somewhat modified by the announcement of the re-opening of the Ford plant at Highland Park Feb. 1, with the prospective employment of some 25,000 men and a production schedule starting, it is reported, at 1500 to 2000 cars a day, and the return to normal output perhaps not far distant.

There has been no authoritative statement from any Ford official regarding the financial situation of the company, but it is stated on good authority that any negotiations that might have been under consideration with New York banking interests were broken off for the reason that the bankers' demands were considered unreasonable by Henry Ford, and it is also understood that he refused to permit a bankers' committee or rep-



Latest Addition to Plant of Heli Co., Milwaukee, Wis., Which Makes This the Largest Steel Dump Body and Hydraulic Hoist Plant in the World.

"The new company's balance sheet shows net current assets of about \$41,000,000 after depreciation, and net current liabilities of about \$6,000,000, the ratio of current assets to current liabilities being approximately seven to one. Inventories have been substantially written down, so that the reorganized company will not be handicapped by having to take into 1921 operations losses chargeable to previous years.

"The reorganized company may be regarded as being upon a sound basis for profitable operation on the basis of reduced sale prices. During the reorganization period points of contact with the public have been more than doubled through establishment of additional selling agencies and branches."

### ATTRACTIVE DISPLAY OF LOX-ON PRODUCTS.

A very attractive exhibit which drew especial interest at the New York show was that of the Automatic Safety Tire Valve Corporation, space D-41, on the fourth floor.

This exhibitor showed for the first time many new items, which included a

### YELLOW CAB CO. TO MAKE CARS AND TRUCKS.

With the opening of the new year a big automotive industry was added to the activities of Chicago. John Hertz, president of the Yellow Cab Manufacturing Co., which for several years has been making the well known line of cabs which bears its name, has just announced that his organization will begin immediately the manufacture and distribution on a large scale of passenger cars and light trucks.

The star of the line will be a 12-cylinder car, called the Ambassador, in touring, closed, sports and imperial sedan models.

Production, however, will be largely concentrated on a four-cylinder car of moderate price, worked out on the Yellow Cab chassis. This line will consist of coupe, sedan, touring car and roadster.

To complete the line the Yellow Cab Manufacturing Co. will get out a one-ton speed wagon truck and 1½ speed truck.

Manufacture will be in the great new factory of the Yellow Cab Co., Menard and Dickens streets, northwest.

representative of the banks to supervise the operation of his plants.

One of the latest features in Ford's affairs is the \$5,000,000 damage suit filed against Henry Ford by Morris Gest, a theatrical producer, alleging libel in statements published in the Dearborn Independent, a newspaper which is stated to be controlled by Ford. Officials of the company stated that this matter would be ignored.

While official announcement is lacking, it is stated on authority that W. R. Campbell, secretary and assistant general manager of the Ford Motor Co. of Canada, will succeed F. L. Klingensmith as vice president and general manager of the Ford Motor Co. Campbell is reported to be virtually in authority at the big factory at Highland Park.

Mr. Campbell is 39 years old and has been with the Ford company of Canada since it was organized in 1904. Prior to that he was with the Queen City Oil Co.

W. C. Anderson, director of operations in Europe, with headquarters in London and Paris, tendered his resignation last week and this was followed by that of Louis Block, in charge of the Philadelphia branch.



# Personal News of Industry and Trade

## Officials Appointed by Manufacturers

E. A. Taylor has been appointed works manager in charge of production by the Liberty Motor Car Co., Detroit, Mich. He has just severed his connection with the Pierce-Arrow Motor Car Co., Buffalo, N. Y., as production manager and, previous to that, held executive positions in charge of manufacturing departments. He was with the Cadillac Motor Car Co. from 1909 to 1912. In 1912 he became associated with the Maxwell Motor Co. in charge of Detroit plants, and in 1913 was transferred to the Maxwell Motor Co.'s plant at Dayton, where he was in entire charge of the plant and foundry, producing motors and rear axles. In 1917 he became general superintendent of the Chalmers plant of the Maxwell Motor Co. and was in complete charge of negotiations and completion of import-



J. V. Whitbeck, President and Designer of New Cleveland Automobile.

In addition to his career as a successful automobile salesman, Mr. Phelps holds a high position in automobile circles, having been state automobile investigator for the State of Illinois and today is a leading member of some of the prominent motor clubs in and around Chicago.

J. H. Desmond who, for the past three years, has been district manager of the Hart-Parr Co. in the Canadian territory, with headquarters at Regina, has been placed in charge of salesmen in the field, with headquarters at the factory in Charles City, Mich.

Dorsey W. Hyde has resigned from the transportation engineering division of the Packard Motor Car Co., Detroit, to become assistant manager of the civic development department of the Chamber of Commerce of the United States.

## Death of Stevens-Duryea Executive

R. B. Jones, sales and advertising manager for Stevens Duryea, Inc., of Chicopee Falls, Mass., was killed the evening of Jan. 5 when the automobile in which he was a passenger was in collision with a taxicab in Springfield, Mass. Mr. Jones, who was returning from his office, was thrown against a building when the machines came together and did not regain consciousness. Both cars were turned over, the drivers escaping with slight injuries. The accident, said to have been unavoidable, was caused by the slippery condition of the pavement, due to heavy rain that was freezing as it fell. Mr. Jones was a prominent member of the younger social set in Springfield, where he lived at the Nyassat club. He was also a prominent athlete, having been



Ralph B. Jones, Sales and Advertising Manager, Stevens Duryea Co.



Sid J. Black, Vice President in Charge Sales, Cleveland Automobile Co.

ant war work in addition to the manufacturing of cars. In 1919 he left the Maxwell Motor Co. to join the Pierce-Arrow company.

William Elliott Phelps, formerly district sales manager for the Haynes Automobile Co., Kokomo, Ind., has been appointed to the position of general sales manager of the same company, according to an announcement by Vice President and General Manager Alton G. Seiberling. Mr. Phelps, who is a graduate of Princeton university, has a long record of successful automobile salesmanship. He was a prominent figure in the sales organization of the Chicago branch of the Winton company, and previous to that was district sales manager of the Haynes Motor Car Co. of Chicago, where he built up one of the most efficient automobile selling organizations in the Middle West. He was also general sales manager of the All-American Truck Co.



J. I. Krall, Treasurer, Cleveland Automobile Co., Cleveland, O.

known as one of the best football men who ever attended the University of Pennsylvania, from which institution he was graduated. Although in 1915, still under 30, Mr. Jones had made an enviable reputation in the business world, having been an electrical engineer with Stone & Webster of Boston and assistant sales promotion manager of the Willys-Overland Co., resigning the latter position in August, 1920, to take the one which he held at the time of his death. Entering government service at the beginning of the war, he was assigned to the coast artillery school at Fortress Monroe with the rank of captain. While engaged at this station as instructor he compiled a 300-page text book on internal combustion engines which was accepted as an authority by the United States government. He was the son of Mr. and Mrs. O. T. Jones of Sumner, Ill., who survive him.

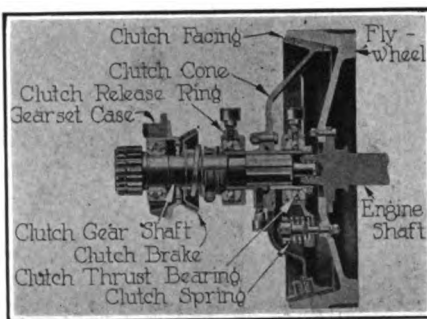
## Components of the Clutch and Their Care

**P**ROBABLY there is no other unit of the car that is subjected to more abuse than the clutch, which is also one of the most important and frequently used, as it is the means of connecting the power of the engine to the other driving units of a car. Slipping the clutch is a common practise with many drivers and little do they realize the damage that it does to the frictioned surfaces.

A clutch may be either cone or disc. The cone type is usually covered with a leather facing, but often has a prepared facing of web-like texture which grips the inner cone face of the flywheel. The disc type is made up of alternate discs of plain steel, steel faced on each side, with a frictioned surfaced material, riveted to the discs. The edges of the frictioned discs may be serrated so as to fit corresponding serrations in the clutch housing, while the plain steel discs are strung on three and sometimes four steel rods attached to the clutch shaft. Slipping the clutch has a tendency to wear the frictioned surfaces unnecessarily and will eventually cause the clutch to slip under heavy loads and the consequent racing of the engine.

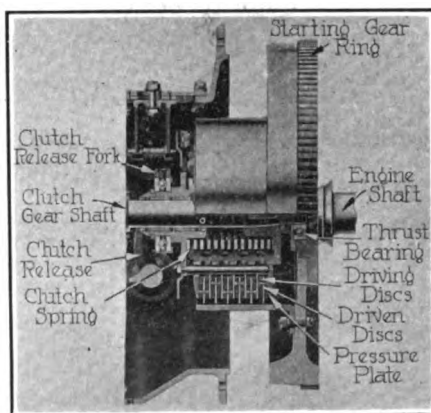
The components of the cone clutch consist of the flywheel into the inner side of which the leather facing fits; clutch leather facing riveted to the cone; clutch cone through which power from the engine is carried to the clutch shaft; clutch release ring by means of which the clutch is operated from the foot pedal; clutch gear shaft which transmits power from the clutch to the main shaft in the gearset; a clutch brake that is used on many cars to prevent the gears of the gearset from spinning when it is desired to change speeds; a clutch thrust bearing which is usually of the ball type and is used to prevent friction between the points of contact at the forward end of the clutch; clutch springs, usually three in number which supply the proper tension between the flywheel and clutch, and the crankshaft of the engine to which the flywheel is bolted.

The components of the disc clutch consist of the driving discs, fastened to studs screwed into the flywheel, usually three and occasionally four in number; driven discs fastened to the hub of the clutch which transmit the power of the engine through frictioned surfaces; a pressure plate fastened to the hub of the clutch and used to supply an even pressure on the driving and driven discs; a clutch spring which supplies proper tension to keep the clutch plates firmly together; a clutch spider which carries the driven plates; a clutch shaft front bearing, inside the hub of the clutch and fitted with an anti-friction ball bearing; a clutch shaft which transmits power from the driven discs to the gearset; a clutch release; a clutch release fork which connects the clutch pedal to the clutch collar, and the clutch release grease tube through which lubricant is supplied to the clutch release.



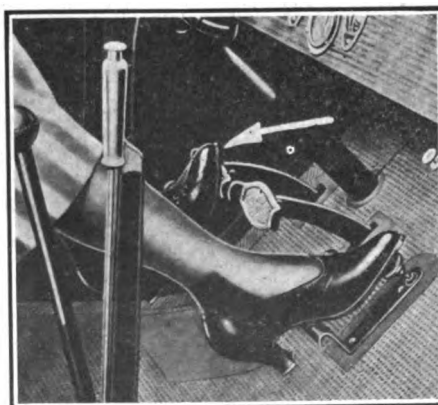
Units of Typical Cone Clutch.

It will be seen from the foregoing list of components of the disc type clutch that many parts are used, and as these all work in fixed relation to each other, care should be exercised in its use, even more so than with the cone type clutch, which is composed of less parts. As a



Multiple Dry Disc Clutch Showing Units of Construction.

majority of the passenger cars are now equipped with a disc clutch, it is of importance that drivers should understand fully its make-up. When operating the car in traffic the clutch should either be kept firmly in place or else held out with the foot. A better method of handling a car in traffic, rather than to try to work through on high, slipping the clutch, is to shift into the next lower speed, leaving the clutch firmly engaged and releasing it only when it is desired to shift back into high.



Position of Left Foot When Riding the Clutch.

### Riding the Clutch.

Another practise that is detrimental to the clutch facings is "riding the clutch." Many drivers practise this from habit gained through long experience in driving cars equipped with cone or expanding types of clutches. While this may not seem harmful at first thought, further study will show that it is detrimental to the clutch facings if persisted in. A slight pressure of the foot exerted unconsciously on the clutch pedal causes the discs to separate slightly and, although the car moves at its accustomed speed, slipping at the clutch is taking place. This will soon cause the clutch to slip badly when driving under a load or taking a hill, and the practise is condemned among drivers who wish to keep the component in working condition.

### Grabbing Clutch.

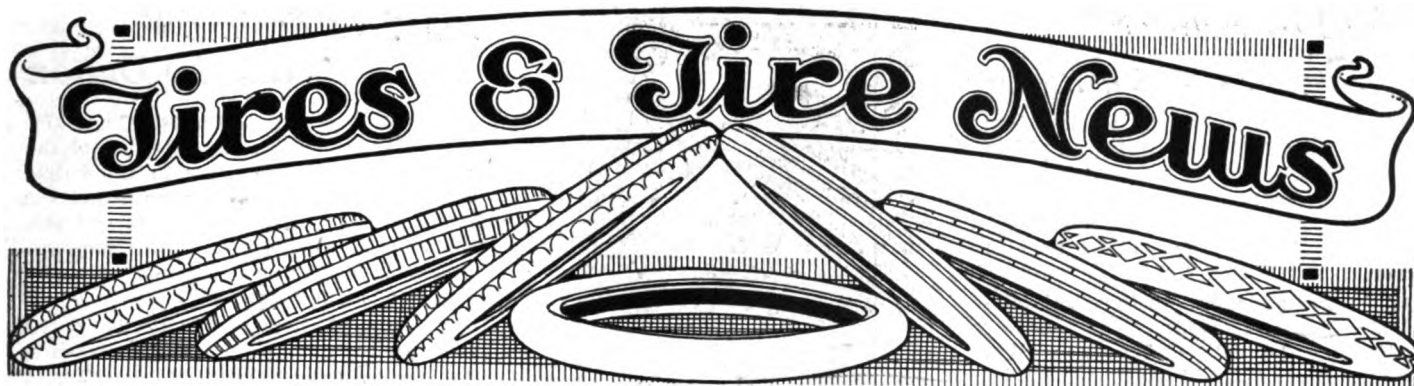
A grabbing clutch is due to too tight an adjustment of the discs in a disc type, or to the facing becoming dry in the cone type. Readjusting the tension supplied by the springs will remedy this defect in the disc type, or washing the facing with gasoline and flowing on a small amount of neatsfoot oil, if the facing is of leather, in the cone type. If the facing of the cone type clutch is of manufactured material and the rivets are causing the "grabbing," the cone requires a new facing. In fitting a new facing the rivets should be countersunk so that the heads will not strike the inner surface of the flywheel. Springs are used in many makes of cone clutches to cause the clutch facing to hold more tightly, and these become weakened and require strengthening. The insertion of small pieces of flat metal under the spring will restore its tension and will prevent further slippage.

### Other Defects.

Sometimes the clutch pedal arm or the rocker shaft to which it is attached may become bent or otherwise out of order and prevent the proper operation of the clutch. The clutch lever, which is operated by the foot, actuates a collar which enables the driver to compress the spring, and this releases the clutch. When the pedal is up the spring holds the parts of the clutch firmly together.

This lever may be pivoted just under the floor boards and the lower end act directly on the collar, or it may be attached to a shaft on which is a rocker arm operating the collar; but the result is the same in either case: Pressing the lever releases the clutch and removing the foot allows the spring to hold the parts together. These parts require frequent lubrication, or a dragging clutch may result.

Sticking of the lever, or an inclination to operate sluggishly, indicates that lubrication has been neglected. The leather facings of the cone clutch and the frictioned surfaces of the dry disc type require occasional renewal. Many manufacturers supply new plates with facings already attached, the old plates being turned in for credit.



## National Tire Association Formed

The National Tire Dealers' Association was organized at Chicago during Show Week, following a three days' session of delegates from 10 cities where local associations had already been established. Cleveland was selected for the national headquarters, and Philip O. Deitsch of that city was named secretary.

The purpose of the association, according to the constitution, is "to advance and safeguard the business interests of tire dealers and to promote a co-operative relationship between the manufacturer, tire dealer and buying public." Membership in the association is restricted to local associations, and a tire dealer in business in a town where there is no association must affiliate with an organization in the nearest city in order to avail himself of the advantages of membership in the national body.

A resolution was adopted defining the legitimate tire dealer. "Whereas," it says, "we believe that the policies of a great many manufacturers have been unethical with reference to their interpretation of legitimate tire merchants, therefore, be it resolved that this association consider a tire merchant to be one who sells tires at retail and whose policies are not dictated by any manufacturer. The definition of a tire merchant shall be as of firms having a permanent place of business, making their major profits from the sale of tires, tubes and tire accessories; also repair men and vulcanizers and such owners of garages who carry a stock of tires and tubes for resale."

Another resolution was adopted relating to the mutilation of used tires, to prevent repair and resale.

The following cities were represented at the conference: Milwaukee, Cleveland, Chicago, Minneapolis, Kansas City, Baltimore, Memphis, St. Louis, St. Paul and Cincinnati, together with individual tire dealers, not organized, from Jackson, Tenn.; Melvin, Ill.; Walworth, Wis., and Little Rock, Ark.

Officers were elected as follows: President, Thomas F. Whitehead, Chicago; vice president, R. F. Valentine, Cleveland; treasurer, Henry Stenzel, Milwaukee. The directors in addition to Messrs. Whitehead, Stenzel and Deitsch are Edward P. Farley, Minneapolis, and



F. H. Ayers, Newly Appointed Director of Sales, Fisk Rubber Co.

A. B. Clark, Kansas City, for one year; Joseph Roberts, St. Louis; R. J. Walters, Baltimore, and R. R. Woolley, Cincinnati, for two years.

It is estimated that during 1921 the country will require 4,000,000 tires for new cars and 24,000,000 for renewals.



William Wield, Recently Appointed Sales Manager of Fisk Rubber Co.

## Fisk Co. Makes New Appointments

The Fisk Rubber Co., Chicopee Falls, Mass., recently announced the appointment of F. H. Ayers as director of sales and William Wield as sales manager. Mr. Ayers has been sales manager for the last four years, and has completed 17 years of service with the company. Mr. Wield has been assistant sales manager for the past three years.

C. H. Gage and L. N. South have been chosen assistant sales managers, and K. S. Chamberlain manager of export sales.

This gives Fisk one of the most efficient sales organizations of any similar concern in the industry.

### FLETCHER JOINS FEDERAL.

Richard E. Fletcher, formerly of the Fletcher-Means Co., El Paso, Tex., has sold his interest in that concern and has joined A. J. Engquist of the Federal Tire Co., distributor of Federal tires in the southwestern territory.

### GIANT CO. TAKES OVER CUPPLES DISTRIBUTION.

Ernest H. Wood, distributor of Cupples tires at Kansas City, Mo., has sold his business to the Giant Tire & Rubber Co., 1314 McGee street. The latter company is headed by H. P. Lindley.

### NEW MANAGER FOR HOUSTON LEE BRANCH.

O. F. Peterson of Fort Worth, Tex., has been appointed manager of the Houston branch of the Lee Tire Sales Co. of Texas.

### NEW TIRE SHOP AT SAN ANTONIO.

The United States Tire Co. has opened a tire shop at 211 North Flores street, San Antonio, Tex., under the management of H. J. Eisenberg.

### ADVANCE CO. MOVES.

The Advance Rubber Co. has moved into its new plant in Brooklyn, N. Y., and is preparing for greatly increased production this spring.

## Meeting to Adjust Goodyear's Affairs

A special meeting of the stockholders of the Goodyear Tire & Rubber Co. has been called by F. A. Seiberling, president, to act on plans for recapitalization and readjustment of the company's finances. The meeting will be held in Akron, O., on March 4.

In a letter addressed to the stockholders Mr. Seiberling said: "The plan for readjusting the debt and capitalization of the company has been approved by the board of directors and already many of the largest creditors and holders of a majority of common stock have indicated their assent to it.

"As will be seen from the statement of the company's indebtedness set forth in the plan, the position of the company is exceedingly precarious. Since the annual statement of Oct. 31, 1920, the company's indebtedness (including contingent liabilities most of which will have to be met) has increased to nearly \$66,000,000.

"Notwithstanding the discouragements of the early months of the current fiscal year, it is expected that if the plan is consummated, operations of the recapitalized company for the remainder of the fiscal year will show a considerable margin of profit over all fixed charges, including contemplated sinking funds, and over dividends on prior preference stock."

### ANNUAL MEETING OF PENNSYLVANIA RUBBER CO.

At the annual meeting of the stockholders of the Pennsylvania Rubber Co., held Feb. 7, the following directors were elected for the ensuing year: Herbert Du Puy, Charles M. Du Puy, Seneca G. Lewis, George W. Daum, A. H. Price.

The directors subsequently re-elected the following officers: Chairman, Herbert Du Puy; president, Charles M. Du Puy; vice president and general manager, Seneca G. Lewis; assistant general manager, George W. Daum; treasurer, A. H. Price; general sales director, James Q. Goudie; secretary, George W. Shiveley; assistant treasurer, C. G. Morrill; purchasing agent, H. H. Salmon.

### BRAHAM HAS BECOME ASSOCIATED WITH DELION CO.

John J. Braham, Jr., of Brooklyn, N. Y., who until recently was connected with the sales department of the Keystone Tire & Rubber Co., New York City, recently joined the selling force of the Delion Tire & Rubber Co. Mr. Braham was elected at the annual meeting of the board of directors of the company a vice president. He will continue to reside in Brooklyn and will make his headquarters in New York at the company's branch, 203 West 72nd street. Mr. Braham and Mr. Seats represented this company at the 21st banquet of the Rubber Association of America, held in New York.



Lynn Harvey, Head of New Export Department of India Tire Co.

### PHILLIPS RESIGNS FROM ESSEX.

R. H. Phillips, sales manager of the automobile accessories and mechanical goods department of the Essex Rubber Co., Trenton, N. J., resigned on Feb. 1. He had been with the Essex over 12 years.

Mr. Phillips' resignation was brought about by his recent election as secretary and treasurer of the National Tire Co., Inc., and the Reliable Tire & Rubber Co., Inc., of Trenton, N. J., succeeding Albert Numbers. These two companies have been in business over five years and their goods are sold extensively in this country and abroad.

### MCCLAREN TIRE DISTRIBUTOR.

The Bayha Tire & Rubber Co., 14th and McGee streets, Kansas City, Mo., has been appointed distributor of McClaren cord and fabric tires in western Missouri and Kansas. These products are made by the McClaren Rubber Co., Charlotte, N. C.



New Delion Cord Tire.

## New Tires Being Made by Delion

The Delion Tire & Rubber Co., Baltimore, Md., signalized the opening of the new year by the offering to the public of two new models, one a cord and the other a fabric tire, which, it is claimed, embody the most recent tested improvements in design, construction and processes of manufacture.

The new Delion cord tire is cured over air bags, under a constant pressure, to stretch out any possible buckles in the fabric, the frequent cause of fabric separation. It has the new jet black, crown tread, which affords an unusual broad, practically flat, non-skid wearing surface, and which distributes road strain evenly throughout the carcass. The husky tread and the broad white band on the side wall make this tire as attractive on the car as it is flexible, resilient and strong.

The new fabric tire is the wrapped tread model with jet black, clover leaf tread, contrasting with white side walls. Its broad tread was designed to afford the maximum non-skid protection combined with long wear.

After its seven years of successful business experience the Delion Tire & Rubber Co. has now moved to its new plant in Baltimore, where improved machinery and the most modern tire building equipment make this what is claimed to be one of the most up-to-the-minute tire factories in the country.

### SYRA-CORD PROSPECTS BRIGHT.

The stockholders of the Syracuse Rubber Co., Inc., manufacturer of Syra-Cord tires, at their recent annual meeting elected the following directors: E. R. Caldwell, R. P. Byrne, R. L. Caldwell, Frank Shane, J. B. Losey, F. G. Mauthe and K. D. Smith.

Reports by the different officers indicated that the Syracuse company is in a strong technical position, having practically no liabilities, high priced materials and tires on hand.

J. B. Losey, general manager, states: "Prospects of business for the coming year seem bright. We have a fine lot of spring orders on hand and are lining up many new and promising distributors."

The directors elected the following officers: President, E. R. Caldwell; first vice president, R. P. Byrne; second vice president, Frank Shane; secretary and treasurer, R. L. Caldwell; assistant treasurer, J. B. Losey.

Lynskey-Neal-Lynskey, the well known Pittsburgh, Pa., tire dealer, was recently appointed distributor of Syra-Cord tires in that territory. William H. Neal, the manager, reports that the outlook for the tire business in his field is very bright.

K. & S. Tire & Rubber Goods, Ltd., has completed the erection of a factory at Toronto, Ontario, Can.



## CARE AND MAINTENANCE OF THE FORD TRUCK CHASSIS

**W**HAT has been stated in previous installments in regard to the Ford car chassis with reference to design and construction will apply to all units of the Ford one-ton truck, save the frame, rear spring and rear axle. The power plant is identical, as is the power transmission system back to the worm shaft of the rear axle. Because of this fact whatever has been stated regarding repair and maintenance of the car chassis will apply equally well to the truck chassis aside from the units specified.

The principal difference in the truck frame is that it is 24 inches longer than the car frame, and it is pressed steel channel section, but of heavier stock and it is deeper, with wider webs.

Instead of a single spring suspended on hangers and perches, with the sharply arched center bolted to the frame, which is the design peculiar to all Ford car chassis, the frame is carried on two quarter-elliptic sections, each of which is clamped into the rear frame member. The spring sections are heavier than those of the car chassis.

### Rear Axle a Semi-Floating Type.

The axle is a semi-floating type, the axle shafts being driven by a worm shaft and worm wheel, the housing being designed to endure the heavier stresses incident to truck service.

The main shaft of the car chassis has a pinion fitted to the rear end that meshes with the mas-

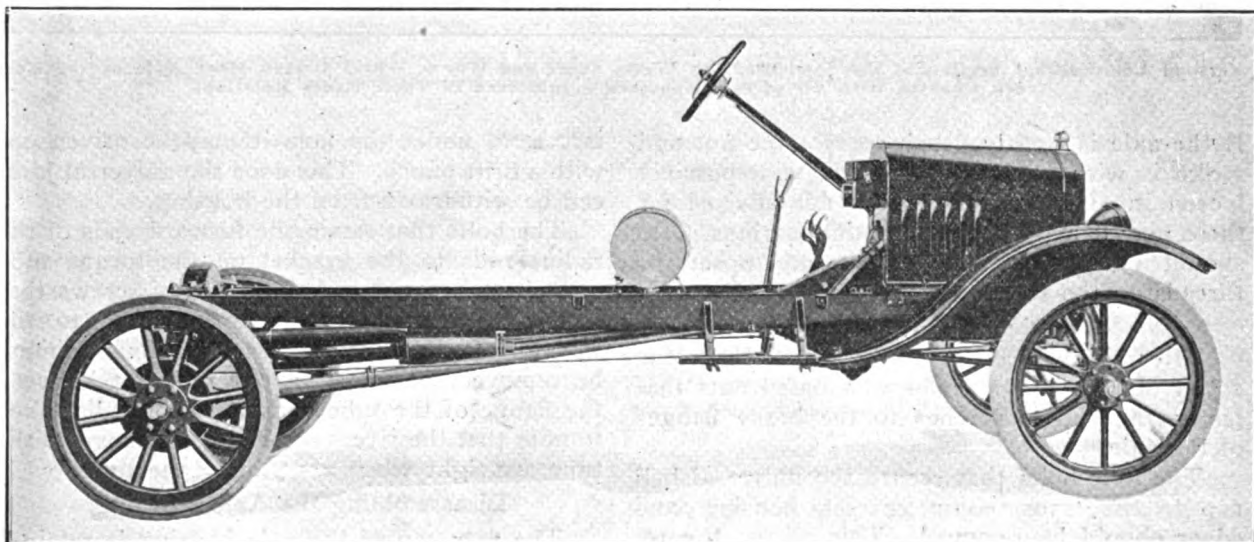
ter gear of the differential gearset, but the main shaft of the truck fits a coupling which engages the forward end of the worm shaft. The truck main shaft is longer than that of the car chassis. The forward end of the driving shaft is coupled to the universal joint as previously described.

Because of the difference in construction the work for maintenance and repair of the axle differs from what has been specified for the car chassis.

### Axle Housing in Two Sections.

The rear axle housing consists essentially of six sections, these being the right and left halves of the case that encloses the worm shaft and the worm wheel, the two tubes that house the axle shafts and the brake flanges or spiders. The tube ends are seated in machined bores in the cast halves of the housing and in the brake flanges. The halves of the housing are secured by 13 bolts, and as the division line is vertical, obviously the entire unit, the drive shaft and torque tube, the radius rods and axle must be removed from the chassis before the axle housing can be separated.

If the drive axles are to be removed the work is practically the same as with the car chassis, but the differential gearset must be disassembled to take out the shafts. The rear end of the chassis must be raised clear of the floor or ground, which can be done with a chain hoist or a block



Side View of the Stripped Ford One-Ton Worm-Driven Truck Chassis, Showing the Heavier Frame, Radius Rods, Driving Shaft and Rear Axle—The Power Plant and the Front Axle and Steering Gear Are the Same as Those of the Passenger Chassis.

## REMOVING WHEELS AND REAR AXLE.

tackle if either is available, and to separate the axle housing the wheels must be removed.

### Care When Removing the Wheels.

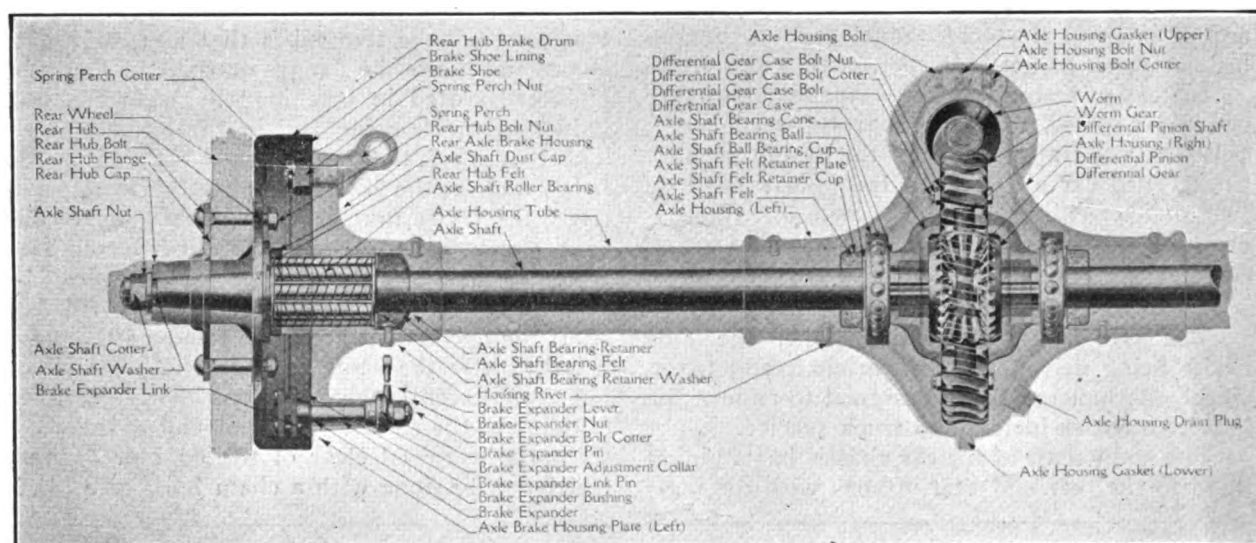
When removing the wheels the axle should be jacked and the front wheels blocked so that the rear axle will not be carried off the jacks. Blocking is better security for the frame than the jacks, for there is no possibility of the frame falling.

To remove the wheels, take off the hub caps with the spanner, force out the cotter pins and back the nuts on the shaft ends. The wheels are secured on the shafts by straight keys fitting keyways in the shafts and wheel hubs. A wheel puller had best be used if the wheel is tight, although there is possibility that wheels may be loose enough to slide freely when the nut is off.

brake rods from the brake levers and drive out the clevis pins and disconnect the brake rod guides from the radius rods.

The frame must be lifted clear, which is best done with a pair of horses or boxes, slightly higher than the frame of the truck, and a section of 1½-inch pipe or two by four scantling, one end of which is placed on a horse. By lifting on the free end of the pipe or scantling and placing it on the other horse, the frame will be securely positioned, and then the rear axle, torque tube and radius rods may be drawn back and placed on a second set of horses or other blocking.

The screw plugs must then be taken from the sleeve of the universal joint globe of housing and the main shaft turned until the retaining pin is seen through the upper hole. When the pin



Vertical Longitudinal Section of the Semi-Floating Worm Shaft and Worm Wheel Driven Rear Axle of the Ford Truck Chassis, with All of the Components Indicated in Their Exact Relation.

If the axle is tightly fitted, reverse the nut and strike it with a hammer, which will possibly loosen it. Hammer blows are not advised for these may damage the differential bearings. Care should be taken not to strike and upset the threads on the shafts.

### Clearing the Rear Axle.

After the wheels are removed, take out the cotter pins and remove the castellated nuts that fasten the spring perches to the brake flanges of the axle.

The four bolts that secure the universal ball cap to the transmission gearset housing and cover should be removed. This allows the removal of the universal joint units, and later permits the removal of the driving shaft. Next remove the cotter pins from the clevis pins of the

is central under the hole it may be driven out with a drift punch. This done the universal joint can be withdrawn from the housing.

The bolts that retain the forward ends of the radius rods to the bracket on the torque tube must be taken out and the series of screws that secure the rear end of the torque tube to the worm shaft tunnel of the rear axle housing must be removed. There is a paper gasket between the flange of the tube and care should be taken to note that the rivets retaining the flange to the tube are tight when assembling the tube.

### Disassembling the Axle Housing.

The rear cap of the axle housing is retained by a series of screws which must be removed, and the cap and paper gasket taken off. The two central sections are secured by 13 bolts five of

### DISASSEMBLING THE REAR AXLE.

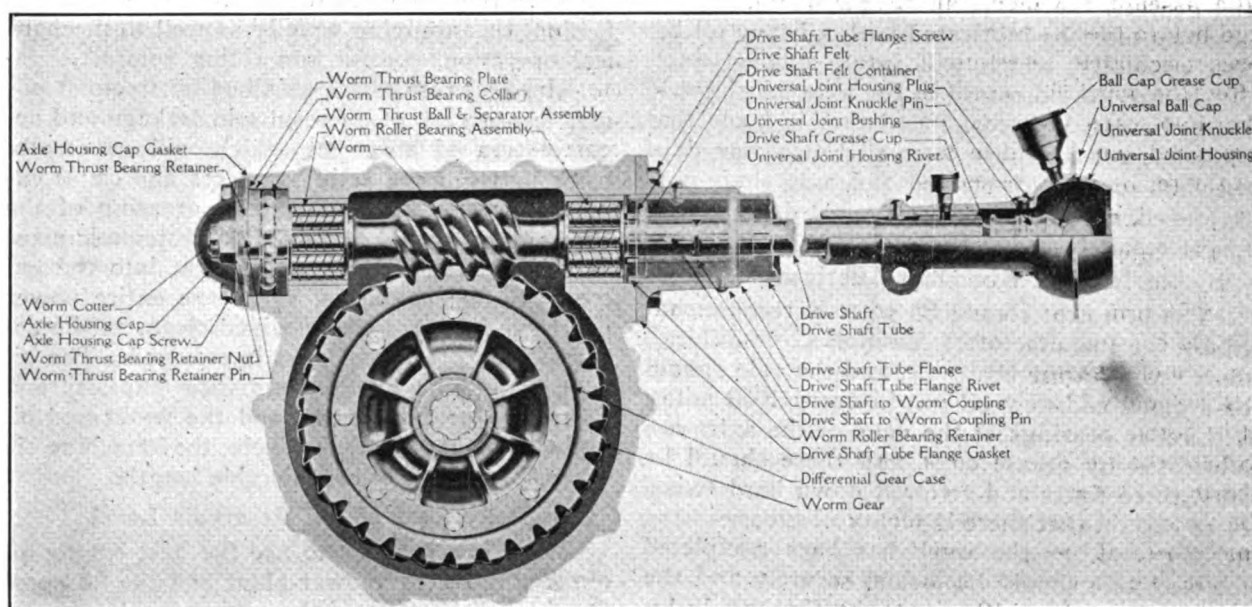
which are at the top; and between the two sections is a paper gasket. Remove the bolts and the two sections can be slipped apart with the axle housing, allowing the worm shaft to be taken out by driving out the pins that retain the coupling between the worm shaft and the driving shaft.

The felt washer, the roller bearing sleeve and the roller bearing can be removed by sliding them over the coupling. The coupling must be driven off the driving shaft and the worm shaft forced from the coupling.

The retaining washer can be removed by taking off the worm shaft nut, and with it the ball thrust bearing and the rear roller bearing. The condition of the bearings should be carefully

gether within the worm wheel with eight bolts, and the nuts are secured with cotter pins. After the pins are removed the nuts can be loosened and the case separated. The differential pinions are mounted on a spider between the gears. After the gears have been separated they can be taken off the shafts by forcing them from the end and removing split rings that are seated in channels in the shafts. The rings may be pried out of the grooves with a screw driver or similar tool.

The gears may then be pulled off and the ball thrust bearings drawn from the shafts. The roller bearings in the outer ends of the axle housing need not be removed. The bearings and the felt washer back of them can be cleaned with gasoline. The felt packing in the housings back



Vertical Transverse Cross Section of the Ford Truck Axle, to Show the Worm Shaft and Its Bearings, the Worm Wheel and Differential Gearset Housing, the Shaft Coupling and the Forward End of the Driving Shaft and Universal Joint.

noted. They should be examined for wear and carefully cleaned.

To disassemble the axle shafts and the differential gearset and the worm wheel, the two sections of the axle housing must be forced apart, the axle shafts being drawn through the roller bearings at the outer ends after the dust caps and the felt washers outside of the bearings have been removed. With the halves of the housing withdrawn, the worm wheel, the differential gearset and the annular cup and cone thrust bearings on which the differential gearset is mounted will remain in one assembly.

#### Removing the Shafts and Gearset.

The differential gearset case is bolted to-

of the thrust bearings can be removed and cleaned with gasoline, while the interior of the housing should be wiped clean. Examine the ball bearings for worn races or cones and cracked or broken balls. If the bearings show evidence of wear, replace them with new. If the axle shafts are worn to any extent replacement is the best advice. There is not much probability of the worm shaft or worm wheel being worn but they should be examined.

#### Especial Care When Reassembling.

The worker must exercise great care in reassembling the axle; for every part must be replaced as it was originally and new gaskets must be cut, fitted and put on with shellac after the

### NEED OF ADEQUATE LUBRICATION.

faces of the members have been cleaned with gasoline.

All nuts and bolts must be seated and drawn tight; and when assembly is complete it is well to go over it again and be sure every one is secured and all nuts are retained with cotter pins. This will be assurance against looseness that would be very damaging. This applies especially to the differential gearset and the worm shaft and wheel, for the relation between the shaft and wheel must be perfect or there will be excessive friction.

The wheels must be securely keyed to the hubs, seated solidly on the taper ends of the axle shafts and the nuts pinned. One cannot be too certain of work of this character. The differential gearset, the worm shaft and wheel, and all bearings must be lubricated with a heavy oil before assembly, which will insure against damage before the oil placed in the axle housing has been circulated. Recommendation is made that after the machine has been driven a few days the hub caps be removed and axle shaft nuts tightened, which will insure against damage that might result from looseness.

#### Need of Abundant Lubricant.

The lubricant should be what is recommended by the manufacturer, Mobiloil C or Whittemore's worm gear protector, and the axle should be drained and new oil put in every 1000 miles. The roller bearings at the ends of the axles are lubricated by grease cups, and these should be filled three times and screwed down hard twice, to be certain that there is plenty of grease in the bearings. After the work has been completed the rear axle should be jacked securely and the engine run at least 10 minutes to thoroughly lubricate the axle and insure against its being driven without complete lubrication.

The truck frame is suspended at the rear on two short springs that are carried at the outer ends on hangers and perches of the same type as those used on the model T chassis, and the other ends of the springs are retained in heavy clips that are secured to the rear cross member of the frame. The ends are bolted as well as clipped and are seated in the channel of the frame. The springs should be lubricated with oil and graphite. The leaves can be separated and the lubricant injected between them or if thick paste is used, it may be placed between the leaves with a broken hack-saw blade. The spring eyes and spring perch eyes are bushed and these can be examined by removing the spring hangers, which may be loosened with a wrench, and if the bush-

ings are worn these can be replaced. The condition of the hangers should also be noted at this time.

#### Lubrication of the Chassis.

Neglect of lubrication is a fault that seems to be common to all passenger car and truck drivers and owners. The cost of repairs of the average Ford car or truck could be reduced full one-half if the machine were kept in a thoroughly oiled and greased condition at all times.

The cost could be even more reduced were all the moving parts of the running gear, steering gear and brake linkage protected with grease-packed boots of canvas or leather.

If the chassis is given a full degree of attention with reference to lubrication the car or truck will afford a much greater degree of satisfaction, this applying equally as well to mechanical operation, control and riding comfort.

The best results are obtained by frequent oiling. An excess of oil results in leakage and accumulation of abrasives which will eventually work between contacting surfaces and cause excessive wear. Both oiling and greasing of the car or truck should be done in a systematic manner. When the vehicle is brought into the garage and the engine is warm, the entire power plant can be more easily wiped clean, as the accumulation of oil and dust is softened. The oil cups should be filled, the grease cups turned down two or three turns and the water and oil replenishments made. Then the machine is ready for a drive of considerable length.

#### Daily Test of Oil Reservoir Level.

Make it a practise to use the best engine oil obtainable for the power plant and the oil cups. On the bell housing of the engine crank case are located two petcocks, one above the other. On some engines one will find an oil gauge. Keep the bores of the petcock open with a piece of wire. Do not depend wholly on a gauge. Try the petcock daily. The oil level should be between the two. The upper petcock indicates high level and the lower petcock low level of the oil in the reservoir. If no oil drips from the lower petcock put in a pint and test. If the tests are made daily there should never be a lack of oil. If the oil is above the upper petcock a blue smoke may show in the exhaust. This will cause the spark plugs to foul, cause carbon to form in the combustion chambers and the engine may skip and run irregular.

If oil flows from the upper petcock when opened, allow the oil to drain till it stops flowing. There is only one time when an excess of oil



### VALUE OF A LUBRICATING RECORD.

should be carried in the reservoir and that is directly after the machine is new or after the bearings have been tightened, or new pistons or rings have been installed. An excess of oil is necessary at such times so that the tight fitting parts may wear in without heating. The capacity of the oil reservoir is approximately one gallon. After the first 500 miles the reservoir should be drained, and thereafter every 1000 miles.

When cleaning the crank case it is good practise to elevate the front wheels from seven to 10 inches above the level of the rear wheels. After the oil is drained from the case pour in a gallon of kerosene. Turn the engine from 35 to 50 times and rock the vehicle, which will wash and loosen the sediment so it may drain out. Then drain the case thoroughly and refill with fresh oil.

#### Lubricating Record Best Safeguard.

For the benefit of owners or drivers who record mileage a fairly safe rule for engine oiling is to add a pint of oil every 75 miles. The commutator, if of the roller type, should receive a few drops of oil daily. Ignition efficiency depends very largely upon the care given the commutator. The bearing of the fan hub should be oiled with equal care.

The only certain method of lubricating a car or truck is to make a record and on this note the mileage of each time oil or grease is supplied. To do this systematically the parts to be lubricated should be grouped, and under each heading should be a column for the date and mileage. The groups should be as follows:

Engine: Replenish daily, if car is used.	
Oil Every 200 Miles	No. of Oil Cups
Tie rod yoke bolts.....	2
Steering knuckle pivots.....	2
Front spring hangers.....	2
Front spring perches.....	2
Steering gear connecting rod sockets	2
Rear spring hangers.....	2
Rear spring perches.....	2
Emergency brake lever eyes.....	0
Commutator .....	1
Fan hub.....	0
Oil Every 500 Miles	
Controller bar brackets.....	2
Controller rod lever eyes.....	0
Brake rod guides.....	0
	No. of
Grease Every 200 Miles	Grease Cups
Fan shaft.....	1
Rear axle bearings.....	2
Grease Every 500 Miles	
Front wheel hubs.....	0

Lower steering post bracket.....	1
Main shaft forward bearing.....	1
Universal joint.....	1
Grease Every 1000 Miles	
Differential gearset.....	0
Grease Every 5000 Miles	
Steering column gearset.....	0

#### Take Nothing for Granted.

The differential gearset housing should be approximately a third filled; or if a semi-fluid oil is used, this should be no higher level than 1½ inches below the filler opening. The grease can be best injected into gearset with a grease gun.

When filling the grease cups make certain that they are filled. Fill the cups and screw down the caps hard. Repeat this and fill them for the third time. When the caps are given two or three turns a day there will be a certainty that the grease is reaching the joints or bearings.

When greasing the front wheels be sure that the outer cones are well adjusted. Keep the universal joint housing and the forward main shaft bearing well lubricated. Clean the commutator frequently with a cloth saturated with gasoline, and be sure to let the gasoline evaporate thoroughly before replacing the cover. Always wipe the oil cups and grease cups clean before filling; and if oil is applied to parts that have no oil or grease cups, see that these are clean and free from dust.

Be sure the oil supplied to the engine is handled in clean containers or measures. The measures should be kept free from dust and other abrasives. Keep the grease clean and tightly covered. Keep the wires attached to the timer terminals clean and as free as possible from grease or oil.

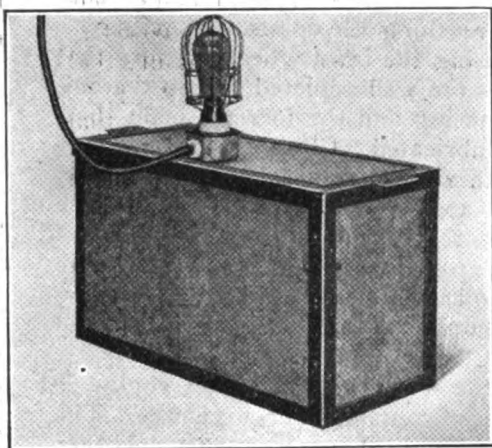
#### TIGHTENING SPARK PLUGS.

Never draw a spark plug down tight into a hot cylinder head. When the cylinder head is hot the diameter of the spark plug hole is slightly enlarged, while the spark plug, which is comparatively cool, is nearer its normal diameter. When the engine becomes cool the cylinder head shrinks on to the plug, the plug making it almost impossible to remove it. Consequently, if the repairer finds a tight spark plug he may be able to remove it by running the engine until it becomes thoroughly warm.

If considerable trouble is experienced from the plugs sticking, it is advisable to wipe the threads, before strewing them into the cylinder head, with a small quantity of flake graphite which has been mixed with a little oil.

# ACCESSORIES, EQUIPMENT AND TOOLS FOR THE GARAGE AND REPAIR SHOP

The Hyrate Electric Oven is said to give practical results in saving time and labor, as well as breakage for battery tear down. The manufacturer also claims that it has the distinct advantage that no labor is required while the battery is being heated, and with the Electric Oven the cells are heated not only rapidly, but fairly and evenly, and without burning or charring the tray or rubber parts, and thus danger from explosion of igniting



gases in the cells is eliminated. They also claim that the Hyrate Electric Oven will do the work of several steam ovens in actual output, as there is no steam gauge to watch, or work of filling the boiler, as with the Hyrate Electric Oven the external solid parts of the battery are thoroughly heated before the solution rises in temperature, so that the plates are not injured by the heat.

The Hyrate Electric Oven is manufactured in two types, one for from 110 to 125 volts, and the other from 220 to 250 volts. It will operate on either direct or alternating current.

Manufactured by Service Station Supply Co., Detroit, Mich. List price, \$38.50.

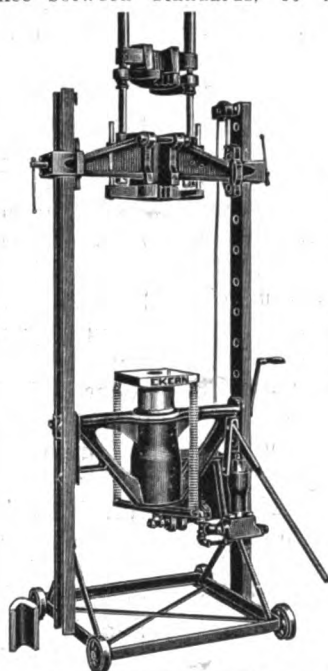
Ekern's Hydraulic Arbor Press is a new appliance which is especially designed for service in the garage, machine shop and factory. While it may be put to many uses it is stated to be especially adapted to force gears, pulleys, collars or bushings on or off shafting without defacing parts, also for straightening shafting, bars or axles, forming metal parts and many other purposes.

The press is built adjustable so the range of work it will do is practically unlimited. It is mounted on wheels so that it may be rolled to any part of the shop and after service may be put out of the way, thus economizing valuable floor space.

This press has a push up extension instead of down and thus with the extension bolts and the extra cross head, which is used when pressing parts on long

shafts, its capacity is claimed to be practically unlimited.

Detailed description: Capacity, 32 tons; distance between standards, 30 inches;



floor space, 31x34 inches; base strong; pump strong, simple packed piston with check valves, placed for convenience of operation; cylinder, heavy cast, bolted to two heavy channel steel upright standards; ram, hollow cast, machined to fit cylinder; diameter, six inches, with eight-inch stroke; lower plate, 11x13 inches, cast to ram; upper plates, one circular and one circular with V cut in for letting small rods or shafting by; springs attached to return ram quickly; cross head very heavy with 3/4-inch U opening adjustable every five inches up to 48 inches from lower ram plate, being raised and lowered by cable over pulley arrangement and fastened with follower castings with heavy lugs which pass through channel standard into cross head and quickly adjusted and forced into place by heavy screws on each side; weight, 800 pounds without extras.

Manufactured by the Ekern-Turk Manufacturing Co., Pipestone, Minn. Distributed by H. G. Paro Co., 1412 South Michigan Avenue, Chicago, Ill. Prices and literature on request.

Pickard's Windshield Protector is especially designed to afford a means of protection against the sun's glare by day and the piercing rays of headlights on approaching cars by night. It is made to fit all models of cars and can be easily adjusted to suit the vision of the individual driver. It is stated that it will

not whip with the wind, is substantial and rigid, and is made with a strength that will withstand all jars and bumps.

It is constructed of genuine Agasote board, bound on all four sides with U-shaped steel, covered with Never-Leak top fabric and fitted with brackets substantially made. It can be curved to fit any top and will remain in the desired position permanently. The Pickard Windshield Protector is not only recommended

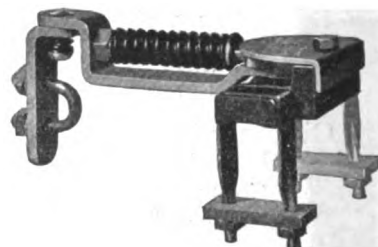


for its utility, but it is also said that it will add to the appearance of any car, being built along lines of harmony and refinement as to detail. It is secured to the car by clamps of fine quality bronze which will not rust or corrode, one set being designed for the majority of touring cars, a second for extra large windshield posts, and still another for closed models. In ordering, the name and model of car should be given, so that the proper clamps may be supplied.

Manufactured by the T. W. Pickard Co., Columbus, O. Literature and prices on request.

The Balcrank Stabilizer for Ford Cars is an aid to ease in steering, is attached to the front axle and tie rod, strengthening. It is claimed, the entire steering mechanism.

It is stated that the Balcrank Stabilizer cannot get off center, lock or freeze, and allows the front wheels to be turned either to the right or left and does not



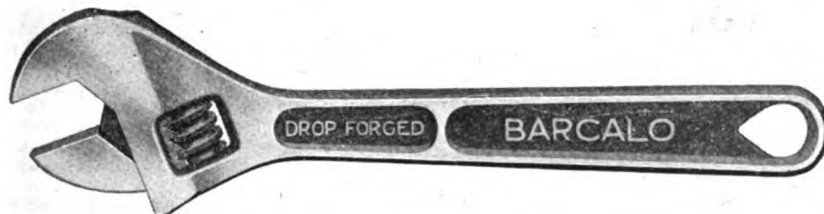
interfere with steering. When driving straight ahead the stabilizer aids the wheels to run straight.

The Balcrank Stabilizer is made of high grade material throughout and is easily attached by any repairer in a few minutes time without the use of any tools other than a wrench. Full instructions accompany each set, showing the method of attaching.

Manufactured by the Cincinnati Ball Crank Co., Cincinnati, O. Price, \$6.75.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Barcalo Model N Wrench is stated to be the culmination of 25 years experience in the making of metal products by the Barcalo Manufacturing Co. Three years ago the company began to develop a 22½-degree angle open and adjusted wrench. The engineers had instructions



to turn out a design equal to any on the market, and to leave nothing undone in the matter of quality. A special analysis steel gave exceptional hardness and toughness. All working parts were so refined that they would be absolutely dependable, so that all parts would work smoothly, no matter how difficult the position in which the user might find himself. A study in heat treatment got the exact degree of toughness and hardness in the finished wrench. It was determined

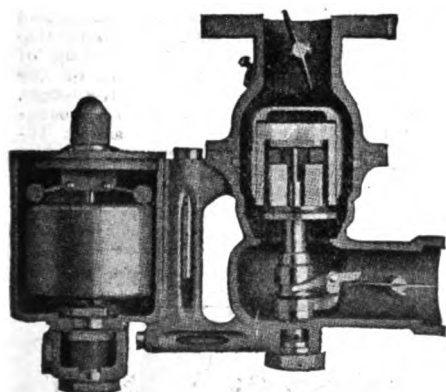
to put a finish on the wrench that would be an index to its quality. The result of all these efforts is the Barcalo Model N wrench. The severest tests have been put on the wrench and it is reported to have stood up admirably under all circumstances.

The Model N wrench, as well as other Barcalo wrenches and Barcalo combination pliers are sold to hardware, accessory and kindred jobbers.

Manufactured by the Barcalo Manufacturing Co., Buffalo, N. Y. Represented in the central western territory by the Barney Moore Co., State and Lake building, Chicago; eastern territory by George L. Holmes, 1776 Broadway, New York city, and southeastern territory by G. R. F. Cotten, 1317 Race street, Philadelphia, Pa.

The Aero Carburetor is stated to be scientifically designed to give perfect carburetion on any motor at any speed and under any weather condition. It is of the constant vacuum type, absolutely automatic in action, feeding the correct amount of air and fuel to the motor at any speed.

The accompanying illustration shows a cross section of the Aero carburetor. The gasoline is fed from the fuel tank through a filter chamber into the constant level float chamber and the starting well, the same level of gasoline being maintained in both. When the motor is ready to start a rich mixture of fuel is sucked into the motor from the starting well. This enriches the normal mixture, making the starting of the motor extremely easy. When the engine has become warm the dash control is pushed back and the fuel is thereafter supplied through the metering nozzle, into which extends a metering pin which is connected with and

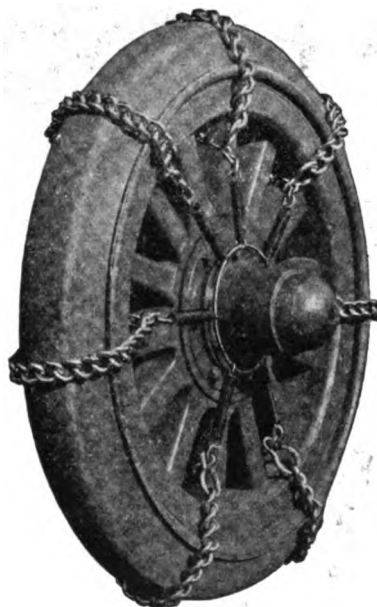


suspended from the plunger. This metering pin, as it is raised or lowered, regulates the amount of fuel being fed. It is also connected with the plunger, which regulates the amount of air taken by the carburetor. As the plunger is raised or lowered the proportion of both air and fuel is scientifically regulated, it is claimed, and a consistently uniform mixture of air and gasoline is in this way supplied for all motor speeds.

It is stated by the maker that the Aero carburetor reduces wear and tear on the car, is as fool-proof as a carburetor can be made, having no air valves, springs or adjustments; and reduces gear shifting in crowded traffic.

Manufactured by the Aero Products Co., 112 Hamilton avenue, Cleveland, O. Price on request.

The Trax-Yun Truck Tire Chain is stated by the manufacturer to be one of most convenient and economical devices of this nature on the market. They are sent out ready for use, with no clamps to fit and nothing to attach permanently. The outfit for each wheel consists of a



center ring which fits loosely around the hub. Attached to this ring are seven springs. Seven chains are looped around the tire and felloe. The links are broad and flat to avoid cutting the tire and to give maximum traction surface. At one end of each chain is a triangle grab link. On the other end is a series of straight links. This end is slipped through the grab link until the chain is taut, then it is fastened to the end of the spring. The center ring and springs exercise equal tension on all the chains and hold them in place with just enough slack to let them slide along the tire, thus preventing gouging that occurs with too rigid chains when there is a sudden stop or continued use.

Trax-Yun truck chains can be used in any number of units. If the road and load conditions only require the use of four chains it is not necessary, because of their design, to apply more. The effectiveness of Trax-Yun chains is not lessened unless the condition really requires the use of complete sets. Usually seven (eight on specially large sizes) are

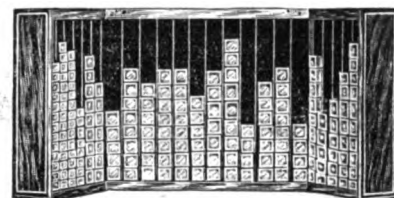
furnished for each rear wheel. The length of each chain is adjustable to the size of the felly and tire by a series of straight links at the end of the chain. These links are for locking in the triangle grab link. Then the springs on the center ring are attached to their respective chains. This ring fits over the hub out of the way and combines every separate chain into a complete unit. Cross chains are all oversize, being made of 7/16-inch steel on large sizes, 3/4-inch on medium and 5/16-inch on the small.

They are packed one set in a canvas bag with size marked thereon. Each set contains 14 complete cross chains for all small sizes (except 32x3½ which has 12) and two rings with seven springs on each ring, all assembled and ready to use on the rear wheels. Large dual sizes contain 16 cross chains.

They are also supplied in sizes for pneumatics, both single and dual.

Manufactured by the Cleveland Chain & Manufacturing Co., Cleveland, O. Sizes and prices supplied on request.

The Champion Spark Plug Merchandiser is the result of an attempt on the part of the Champion Spark Plug Co., maker of the well known Champion products, to further its service policy by the developing and perfecting of a merchandising device or silent salesman for the use of its dealers. This is presented in the form of a cabinet of neat and sub-



stantial construction equipped to carry a supply of every type of Champion spark plug made. Individual compartments separate the various types, making it a simple and easy task for the dealer to select the type of plug called for. The accompanying illustrations show the front and rear views.

The merchandisers are modern in every respect with steel covers, on the front of which are carefully worked out index charts giving the special mark or symbol number of every plug carried in the case or made by the Champion Spark Plug Co. With the aid of the index chart the selection of the proper type of plug for a customer is a matter of but a moment, whether it be for passenger, commercial, tractor, motorcycle, motor boat, farm or stationary engine.

The Merchandiser is 31 inches long, 13 inches high and 11 inches deep. It can be placed to advantage on any show case, counter or shelf and because of its neat appearance makes a handsome fixture for any store. One of these Merchandisers



will be delivered to any dealer ordering a full assortment of 200 Champion spark plugs and 100 insulators, and as the company allows the dealer to specify any one of five different assortments of plugs, he should have no trouble in selecting a combination that will meet his trade requirements.

Distributed by the Champion Spark Plug Co., Toledo, O.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Forc-Ful Lubricator is especially designed for the convenient and economical lubrication of the wheels of the Ford car. The usual method of lubricating these members is to fill the hub caps with hard grease and then to screw them on to the end of the hub, thus forcing the grease into the bearing. With the Forc-Ful device the end cap of the lubricator is removed and the lubricator filled with grease, is screwed on the hub in place of the cap, and after being thoroughly seated on all the threads the plunger is screwed down and the entire contents of the lubricator may be, if desired, forced into the hub, pushing the old grease out ahead of it through the opening around the inner wheel bearing.

By this means every bearing of a Ford car designed for hard grease lubrication may be thoroughly cleaned and filled with fresh grease in no more time than is often spent in trying to force grease into a single bearing by the grease cup method.

The Forc-Ful lubricator equipment includes a powerful screw plunger grease gun with automatically closed nozzle, and fittings for all parts of the Ford car designed for hard grease lubrication, as follows: Four straight line connections for rear transmission bearing, universal joint and two rear wheel bearings; one

tact, determined in the design of the timer, remains uniform at all speeds. The result, the manufacturer states, is long life and perfect operation. With the U. & J. the roller is absolutely abandoned. The contact blocks are set on steel springs that exert a constant pressure. They cover the whole face of the rotor, making groove wear impossible. The springs are high tension and heat treated. They never lose their "spring" and "snap," it is claimed, even under excessive heat. Since the rotor is the only movable part revolving inside the contact blocks, all sediment falls into the base of the timer—centrifugal force throws all dirt or grease off the rotor, so that the timer cannot become clogged. The shell of the timer back of the contact blocks is lined with insulating material, making, it is claimed, short circuits impossible. The edges of the contact blocks are rounded, both front and back, so that a reversal of the motor cannot cause damage from back fire.

The timer is strong and heavily made throughout. The terminals are strong and tight and cannot loosen.

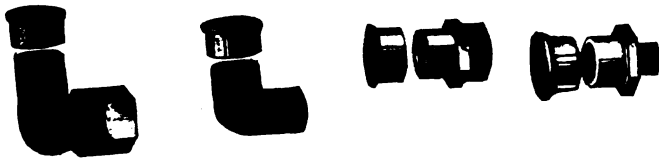
Manufactured and sold by the U. & J. Carburetor Co., 505 West Jackson Boulevard, Chicago, Ill. Installed on a 15-day trial and guaranteed to give perfect satisfaction. Retail price, \$2.50.

great a fluid surface exposed to the air in which the fuel is entrained that the resultant heat due to compression and explosion shall vaporize completely and thus render available all the energy contained in the fuel at the proper time. It is obvious, therefore, that the heating of the fuel is merely intended to accomplish a fine division of spray and not intended to force vaporization, which would result in reduced volumetric efficiency.

At present the Duro Fuel Converter is being produced for attachment to Ford motors only, but the maker is preparing to equip many other standard makes of cars on which successful trials have been made.

Manufactured by the Duro Co., 96 North 15th street, East Orange, N. J. Information as to prices, etc., on request.

The Top Converter for Ford Cars has been developed by the manufacturer to supply Ford owners with a type of converter which quickly changes the old style top into a one-man type by simply removing the two front bows and substituting the bows and irons of the converter. With this device the top is fastened to the top of the windshield as in the one-man top, while provision is made for raising and lowering the top equipped



special straight connection for the differential housing; two elbow connections, one each for the fan and steering post bearings; four special elbow connections for the steering pins, or king bolts, and tie rod bolts.

Manufactured by the I. C. Manufacturing Co., Chicago, Ill. Sales Department, the Zinke Co., 1323 Michigan avenue, Chicago. Jobbers' proposition on request.

The U. & J. Timer is built on a principle that is new in timers, it is claimed, but that has been proven practical for years in electrical dynamos and generators—namely, the rotor principle. The rotor is the only moving part of the dynamo—similarly the rotor is the only moving part in the U. & J. Timer, there being no rollers. The rotor of the U. & J. Timer is made of specially prepared insulating material so hard, dense and

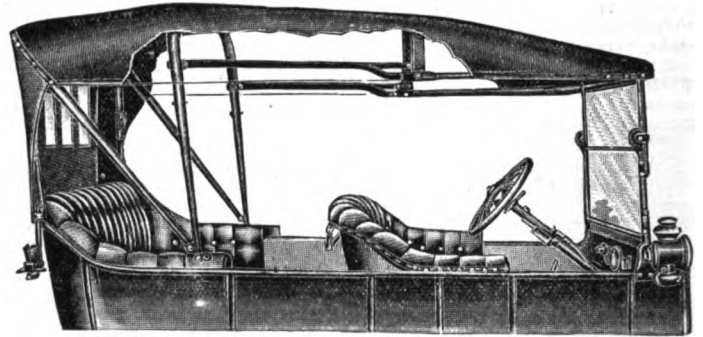
The Duro Fuel Converter is a new attachment for the carburetors of Ford cars which, by heating the gasoline immediately before it is sprayed into the air stream, is able to effect economies in fuel consumption that should attract widespread attention in view of the present cost and low grade of motor gasoline.

Many inventions have been offered to the motorist for the saving of fuel, ranging from new carburetors of high price



and complex construction, to simple attachments to the intake manifold whose sole function is to admit additional air to the mixture without passing it through the carburetor.

The Duro Fuel Converter is based on the principle that liquids become more fluid by heating them and on the assumption that low grade gasoline is less fluid than high grade. Its function is to reduce the viscosity of motor fuel in order that the pulverizing effect of the air stream through the carburetor shall result in a spray of the finest possible division. It is intended that the fuel in this condition: i. e., liquid, shall be carried to the cylinder in order that the highest possible volumetric efficiency shall be obtained, while at the same time having so

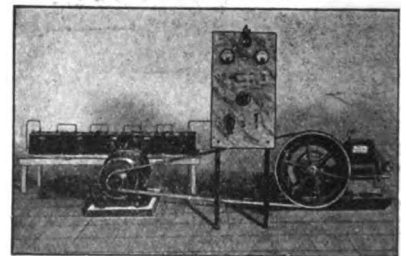


with the converter when desired.

Manufactured by the Fulton-Houston Co., 1146-1150 South Michigan Avenue, Chicago, Ill. Price on request.

The Main MCF Lighting and Charging Set is a new outfit recently added to the well known Main line, especially designed for lighting the suburban garage and also to supply equipment for the charging of automobile batteries. It consists of the Main MCF plant using a 600-watt, 40-volt, direct current generator, a 1½-horsepower gasoline belted engine and a 16-cell sealed glass jar type battery for the lighting of the garage and an extra panel on the switchboard for charging from one to 10 six or 12-volt batteries to automobiles at a time.

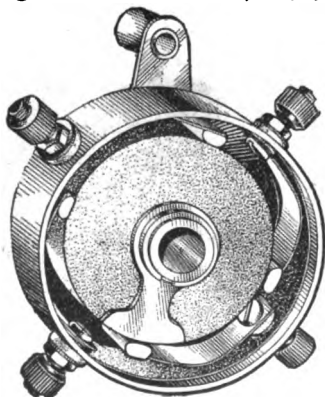
This equipment is of the same high quality of construction as is characteris-



tic of the entire line of the Main Co.

By the use of the MCF plant any garage or repair man is absolutely independent of any outside source of current and is in a position to earn big returns on the investment, by the charging of storage batteries alone, the maker states, to say nothing of the convenience of having such an outfit available at all times.

Manufactured by the Main Electric Co., Cleveland, O. List price for complete plant, \$290.



tough that it cannot gather moisture, it is stated.

It, therefore, gives a clean wipe contact, insuring a hot spark to each plug, because the pressure exerted by the con-

(When Writing to Advertisers, Please Mention the Automobile Journal.)



# TRADE OUTLET

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Cylinders, 8.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

## BRIGHTMAN AUTO EXCHANGE

331 Windsor Ave., Hartford, Conn.

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50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo, Overland and 200 other makes.

Motors, \$20.00 up	B. Presto Tanks, \$4.00
Magnetos, \$3.50 up	B. Presto Tanks, \$4.75
Cylinders, \$3.00 up	Bearings, 50c up
Springs, \$1.00 up	Bims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here, Write Us—We Have It.

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18-20 Morgan St., Hartford, Conn.

Send Your Repair Work to Specialists.

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303 Knoxville Avenue, Peoria, Illinois.

## COTTON WASTE, WIPING RAGS, CHEESECLOTH.

Adapted for automobile use, in 1/4 lb. and 1 lb. cotton bags and paper cartons.

SOFT, CLEAN, WHITE COTTON WASTE.

Assorted wiping rags—New, clean sanitary. Sample on request.

STANDARD WASTE & RAG CO.  
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Send for our free complete Price List covering Auto Dealers, Owners, Ford Dealers, Truck Dealers and Owners, Garages, Auto Mfrs. and etc., any state. A. F. WILLIAMS, Mgr. of List Dept. 168 W. Adams St., Chicago, Franklin 1183.

## Instruction Book Should Be Carefully Studied

**A**N INSTRUCTION book should accompany each new car when it is delivered by the dealer to the customer, and as this book contains information covering the mechanism of the car in detail it should be unnecessary to call attention to the fact that this should be carefully studied by the motorist so that he may familiarize himself with the working principles of his particular car. Battery manufacturers also include a pamphlet covering the construction and care of the battery and this also requires study to master the details. With the changes constantly being made in construction even the experienced motorist is wise to keep himself posted by a careful perusal of the instruction books.

Referring particularly to the storage battery pamphlet, this booklet besides giving a brief idea of the construction, goes considerably into details of how to test the specific gravity of a battery, showing what the different tests are for and how to go about making them.

A battery may become discharged because the demands upon it have been unreasonably great, because it has been discharging through a short circuit or accidental load, or because the generator has not been charging it sufficiently. When this happens it will generally be found preferable to recharge from some outside source of current rather than from the generator of the car and this generally necessitates taking the battery to a service station or doing the work in the home garage. The advantage of the latter is that the owner may not have to suffer the loss of use of the car, as the operation can be carried on during idle moments, as at night. However, if there is anything wrong with the battery, home recharging had better not be attempted.

The apparatus needed is a source of current, means of connecting it to the battery, a low reading ammeter and a battery hydrometer. The current must be continuous or direct, flowing in one direction constantly and not be of the alternating variety.

Comparatively few motorists have access to direct current lighting or power circuits, but such as do would only have to cut down the voltage of the supply to the required value, by resistance in the form of incandescent lamps, connected in multiple. The average motorist has alternating current for lighting in his garage and thus must obtain some means for changing this into a low direct current.

A rectifier or small alternating current motor driving a low voltage, direct current generator is the apparatus required. Rectifiers are upon the market in considerable variety and such instruments usually embody an ammeter and means for connection to a lamp socket.

The battery, if at all accessibly located, can usually be charged without removal from the car and it is best to obtain an extra clamp connection, exactly like that regularly provided with the battery, which should be permanently connected to the flexible cable that is to be used as one of the charging conductors. In recharging the terminal clamp of the battery that is not grounded should be removed and this extra clamp secured in its place, the second wire from the charging source being grounded upon the car frame or power plant.

The current must pass through the battery in the right direction and with most forms of rectifiers this is automatically taken care of, but in charging from a direct current supply circuit the direction of the current flow must be tested

and the connections to the battery made accordingly.

Every battery bears a plate upon which the maximum or starting charge rate and the finish rate are given in amperes. The former is the largest amperage that should be put into the battery and should not be continued long after the cells give off gas freely. The latter is a safe rate to use when a cell is already charged to the gassing point and is used for long periods in restoring a badly sulphated battery.

The procedure in recharging is as follows: Fill all cells to normal level with distilled water; apply the charging current at the starting rate until the liquid bubbles freely, then reduce the current to the finish rate and continue it until the liquid in each cell tests from 1275 to 1300 by the hydrometer or until the readings cease to increase with further charging.

How long the current will have to be kept on depends on the conditions of the cells. Batteries that have lain discharged may require a finish rate for days or this rate may have to be applied for long periods to bring up one "dead" cell. In charging from a direct current supply circuit its positive wire must be attached to the battery terminal marked positive and vice versa, and in no other manner.

By holding the bared ends of the two charging wires apart in a glass of slightly salted water gas will be given off freely from one of them and less freely from the other. The latter wire is the positive and should be connected to the positive terminal of the battery. The gas formed when a battery is bubbling is highly explosive and open lights or sparks should not be allowed near.



## PICK-UP

ANY attempt to convey in words an impression of the wonderful pick-up which a Zenith Carburetor gives to a motor is bound to fall short of its aim.

Even to refer to the fact that De Palma's world record for acceleration was made in a Zenith-equipped car is inadequate.

But to sit behind a Zenith-equipped motor, waiting for the traffic signal "Go", and then to feel its response at the first touch upon the throttle—that is truly convincing.

### Zenith Carburetor Co.

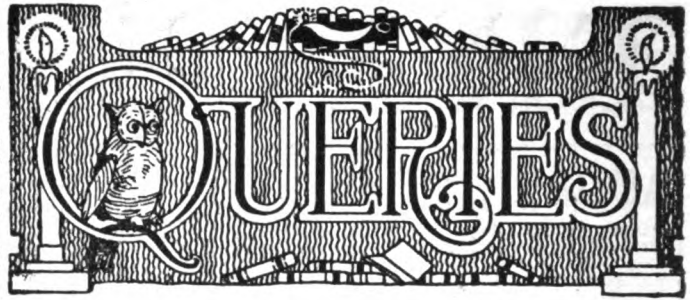
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### WANTS TO USE PASSENGER CAR FOR TRACTOR.

(L. E. O., Hoosick Falls, N. Y.)

I have seen several attachments for the Ford car and have heard that they will successfully pull a 14-inch single plow. Would it be possible for me to rig up a larger car with a similar attachment and expect to pull a 14-inch two-bottom tractor plow successfully?

We would not advise that you go to this expense as nearly all of the attachments which are in the market are adapted only for the Ford, and we are under the impression that you would meet with difficulties in fitting the parts. Whether such an outfit would work successfully or not we cannot say. Would advise that you write to your state college and get its bulletins showing what results have been obtained, or for you to get in touch with local parties who own tractors and get the benefit of their experience. By attending field days during the coming year, where tractors are shown plowing under various conditions, you should be able to judge just how a tractor will work on your farm. There are several small tractors offered that will do good work under your conditions and, by watching them at work, you can form your own opinion of which is best for your use.

Some of the agents may be willing to demonstrate on your farm, if approached properly, and you would get a still better idea of the work they are capable of doing.

### MEANING OF LAPPING IN.

(C. W. E., Boston, Mass.)

Can you inform me what is meant by piston rings being lapped in, and if it is necessary to remove the engine of a Ford from the frame in order to remove the cylinder block so as to replace old piston rings? Will you explain the meaning of two and four-cycle engine? Please give me the formula for figuring the horsepower of a gasoline engine.

Lapping in a piston ring or piston means working it up and down in the cylinder bore, with a lapping compound, such as ground glass, carborundum or similar abrasive (not emery), between the piston and the cylinder in order to bring the two into closer contact.

In tearing down the Ford engine, better results are obtained by removing it from the frame, as there are many parts that one may wish to disassemble. This can only be done when the engine is out of the frame.

A two-cycle engine is one which completes its cycle in two strokes, and a four-cycle engine similarly in four strokes; that is, on a two-cycle engine one stroke is explosion and exhaust with intake and compression occurring on the next and, with this arrangement, every alternate stroke is a firing stroke. On a four-cycle engine every fourth stroke is a firing impulse; one stroke being power or firing; the second, exhaust; third, suction, and fourth, compression; the cycle then being repeated.

The formula most commonly used for calculating the horsepower of a four-cycle gasoline engine is the square of the bore (that is, the bore multiplied by itself), times the number of cylinders divided by 2.5. This gives the horsepower based on 1000 feet a minute piston speed. For higher piston speeds than this, multiply accordingly.

## CELLULOID VARNISH.

(E. T. G., Detroit, Mich.)

In the December, 1920, Automobile Journal, page 86, a method of lacquering brass is described and mention is made of a finish called celluloid varnish. I have long sought a varnish having the smooth, glossy effect, such as is found in celluloid, but have never been able to obtain it through the ordinary commercial channels, and would like to ask where or how this varnish may be obtained. Also do you happen to know if there is a varnish firm located in the State of Illinois called the Arsenal Varnish Co.

Celluloid varnish is made as follows: Dissolve uncolored celluloid in a mixture of strong alcohol and ether. The celluloid first swells up in the solvent, but after vigorous shaking and the bottle is allowed to stand for the undissolved portion to settle, the clear, supernatant fluid is poured off. The latter may be immediately used. It yields a colorless, glossy lacquer, which may be colored as desired, with aniline dyes.

Celluloid lacquer is made by the Kyle Manufacturing Co., 27 Second National Bank building, Uniontown, Pa., under the trade name, "Kylolust."

The Arsenal Varnish Co. does not appear in any of the trade directories. Possibly it has reorganized under another name.

## STUDEBAKER STARTING AND LIGHTING.

(C. H. S., Dayton, O.)

Will you give me information of the lighting and starting system of the No. 35 Studebaker car, serial No. 106,580, also the differential and transmission gearset of this car?

The lighting and starting system of Studebaker cars is a combination of Wagner generator and motor, each separate units, and a Remy ignition system. The dynamo or generator is a shunt wound type, with four field coils and four brushes, one of which is regulating and the other three generating. The cut-out is an electro-magnetic type, located on the dash. The motor is a series wound four-pole type with four brushes. The starting switch is a double-contact type with the resistance in series on the first contact. The voltage is 12 and the output is from seven to nine amperes. The regulation is of the shunt field current by the third brush. The electro-magnetic cut-out has a double set of contacts. The field fuse is located on the housing of the generator.

The generator is mounted vertically at the left side of the engine and is driven by a spiral gear from the timing gear-set. Its current output begins at a car speed of about 10 miles an hour and reaches maximum at approximately a speed of 18 miles an hour. The motor is driven by chain and sprockets from the crankshaft, there being an over-running clutch incorporated with the crankshaft sprocket. The location of the motor is at the right side of the engine.

The circuits throughout the system are one wire—one insulated wire from the battery to each electrical unit. The head lamps are seven-volt, 12-candlepower, and for the tail and speedometer lamps, seven-volt, two-candlepower.

Generally speaking, unless the battery is in the circuit a third brush generator should not be operated; unless so connected there is probability of burning a field winding or a field fuse. For the purpose of regulation the third brush contact with the commutator is between two of main brushes, closer to one of these, and the difference in voltage between the third and the main brushes depends upon the distance between the third brush and the main brushes—the greater the distance the greater the difference in voltage. The voltage of the current output depends on the voltage action on the field winding, and the voltage is dependent upon the third brush position. This voltage difference is that found between the third brush and the main brush farthest from the third brush and of opposite polarity, and for this reason moving the third brush either farther or nearer from the main brush that is the greatest distance from the third brush will increase or decrease the current output.

Normally the cut-out will require no attention unless the

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Walback Tower, Portsmouth, N. H., was built in 1812 by Colonel Walback. Within is a rude pintle-stone on which a thirty-two pounder could be swung.

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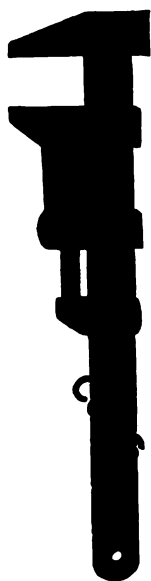
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indicator shows discharge when no current is used for ignition, lights or horn, in which event the cut-out cover must be removed and the contacts examined. If the contacts are stuck together they should be separated and the faces dressed smooth.

If for any reason the engine is driven with the generator, and the battery out of the circuit, the generator should be connected by a wire from its terminal to the metal frame of the generator or the engine, and this ground wire should be removed when the battery is replaced in the circuit. Always use a copper wire for this connection. The generator should be oiled when driven approximately 2000 miles, and at regular intervals as nearly as possible represented by that mileage.

The ignition unit is mounted at the front of the engine and is driven at half the speed of the crankshaft. The coil is on the side of the distributor. The contact points should separate 15/1000 inch and the spark plug electrodes set 25/1000 inch apart. The firing position for setting the spark may be determined by opening the relief cock of No. 1 cylinder and turning the engine by hand until compression is felt against the finger or thumb. The exact upper dead center position is indicated on the flywheel by the mark "UP-D-C-I." and the wheel should be turned until this mark is four inches back of the pointer (before reaching it). This is the point for the fully advanced spark in No. 1 cylinder. Next advance the spark lever fully and the timer control should be as far advanced as possible. Then remove the distributor head, but do not disconnect the wiring. Lift the distributing segment and loosen the nut that secures the cam to the shaft. Now force the cam from the shaft with the special tool supplied for this operation. Turn the cam against the direction of rotation of the shaft until so positioned that when reassembled the edge of the distributing segment will come directly under the No. 1 terminal, and then continue turning until the breaker points begin separating. Then the lock nut can be tightened and the distributing segment holder and cover replaced.

These are the essential facts necessary for ordinary adjustments of the generator voltage, the cut-out and the ignition system. Complete description of each electrical and circuit, the possible causes of failure and the means of restoration cannot be attempted because of lack of space.

The transmission gearset and the rear axle of the Studebaker chassis are assembled as a unit, the gearset being enclosed in a housing ahead of the central section of the axle housing that encloses the differential gearset. The gearset affords three forward speed ratios and reverse and is a selective sliding gear type. The axle is a full-floating construction, the wheels being mounted on the ends of the axle housing on double taper roller bearings. Each axle shaft is keyed to a driving flange that is in turn bolted to the wheel hub. By removing the bolts from the flanges the axles and flanges can be withdrawn, leaving the wheels on their bearings and supporting the axle. On removal of the shafts the bearings can be adjusted by bending flat and bent lugs of the lock washers and removing the lock nuts and adjusting washers, and turning the adjusting nuts until they lay has been taken up. The adjustment should be such that the wheel will turn freely, but not have side play. This done, replace the washers and the locking nuts, and when seated bend the washers against the nuts. Then put in the axle shafts and bolt the flanges solidly to the wheel hubs.

The pinion shaft is fitted with a Timken roller bearing, and this can be adjusted by removing the hand hole cover from the gearset case and loosening the set screw that retains the adjusting nut. In making this adjustment extreme care is necessary that the bearing be not too tight. The wheels should be jacked, the gears set in neutral and the cover plate at the rear of the axle housing taken off.

The differential gearset is a bevel gear type. When the rear cover of the axle housing and axle shafts have been removed the gearset can be removed from the housing. At either side of the differential gears is an adjusting collar, by which the location of the master or ring gear with reference to the driving pinion can be established. This adjustment must be cautiously made, so that there will be exact meshing of the pinion and gear.

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In announcing the family of Dort cars to the American public we purposefully and carefully confined ourselves to the barest statement of fact.

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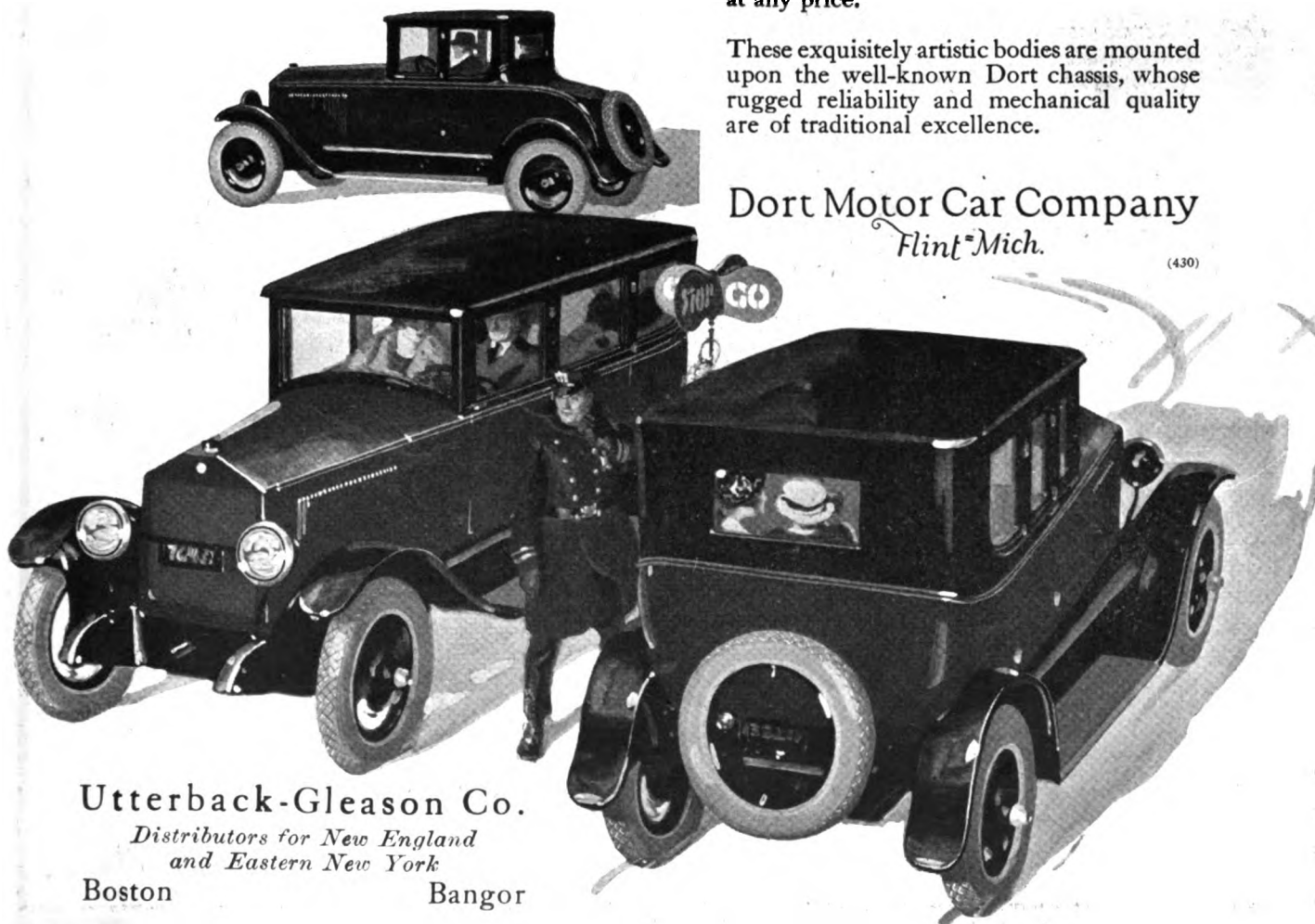
We sought in no way to influence the country's verdict, for we were serenely sure that the rare charm of these bodies, alone and unenhanced by anything we might say or do, would completely capture the appreciation of everyone who viewed them.

Our faith has been justified a hundred-fold. Not only have they been termed the most remarkably beautiful cars in the moderate price field but many say they are unsurpassed at any price.

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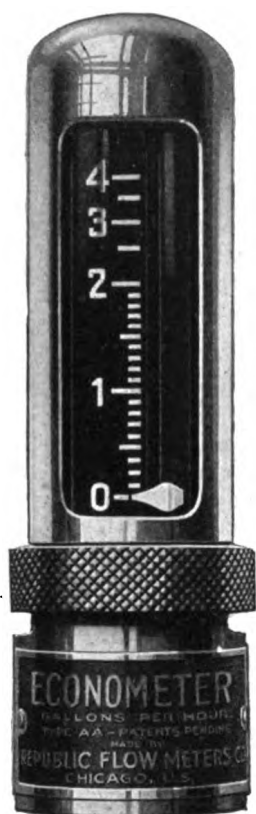
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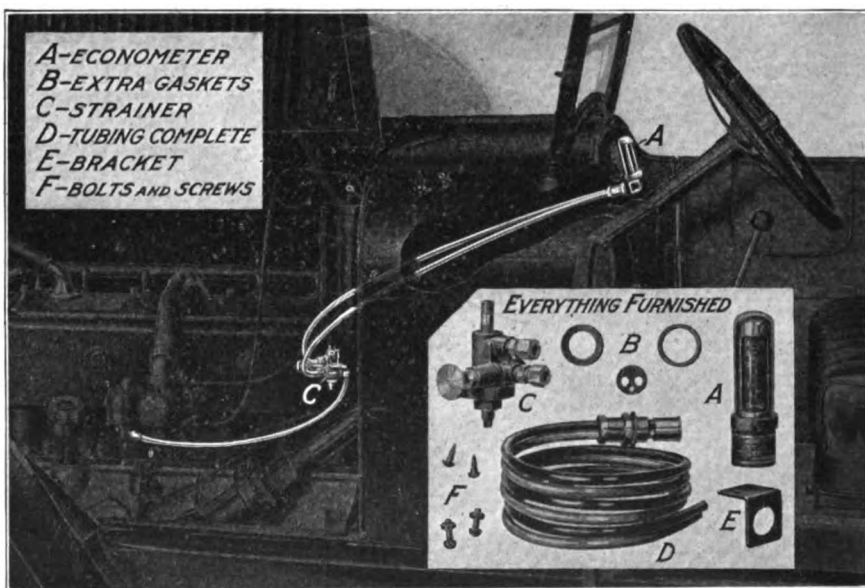
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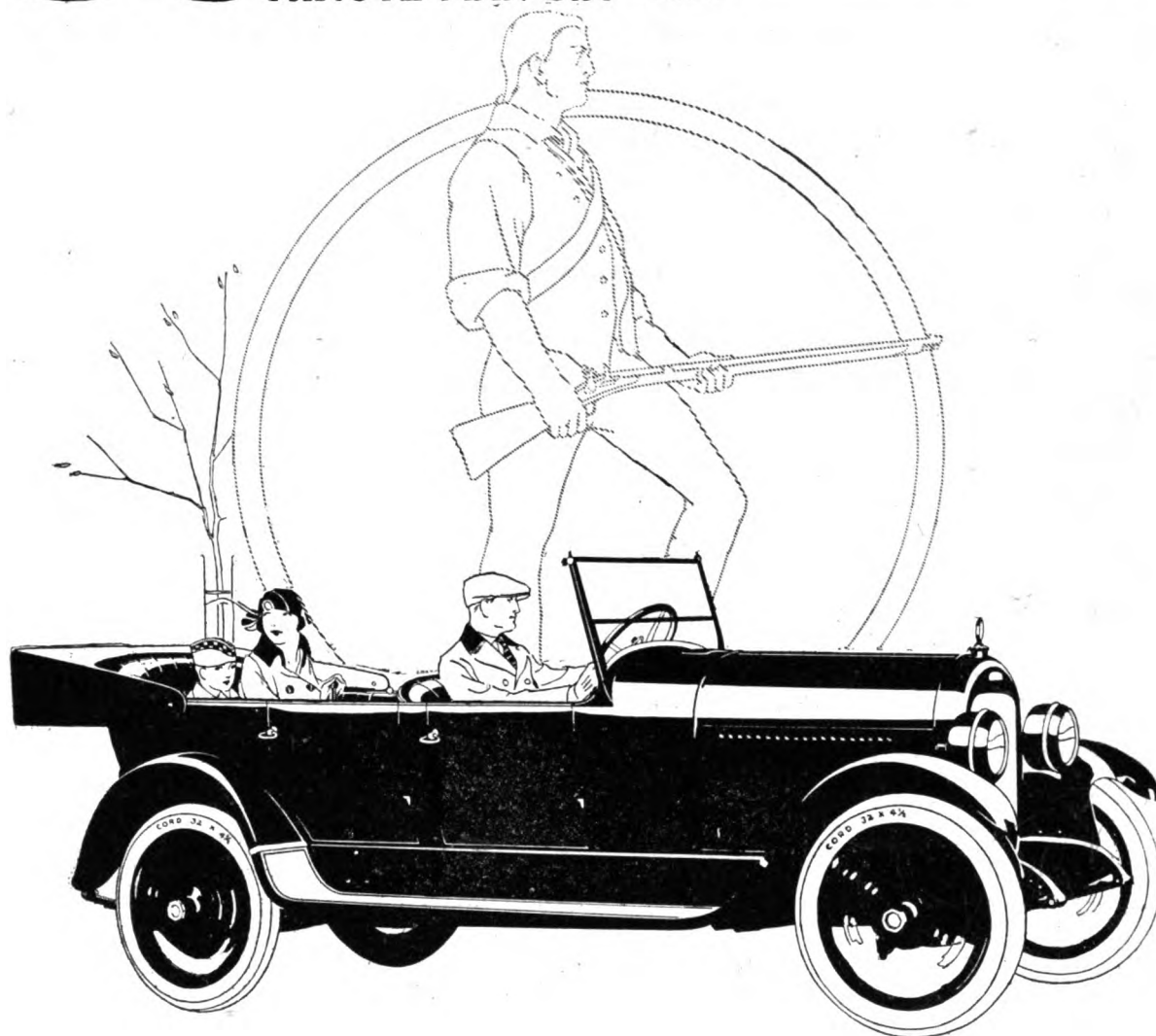
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MINUTE MAN SIX



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It is manifestly easier to compete by selling Lexington than to compete by selling against Lexington!

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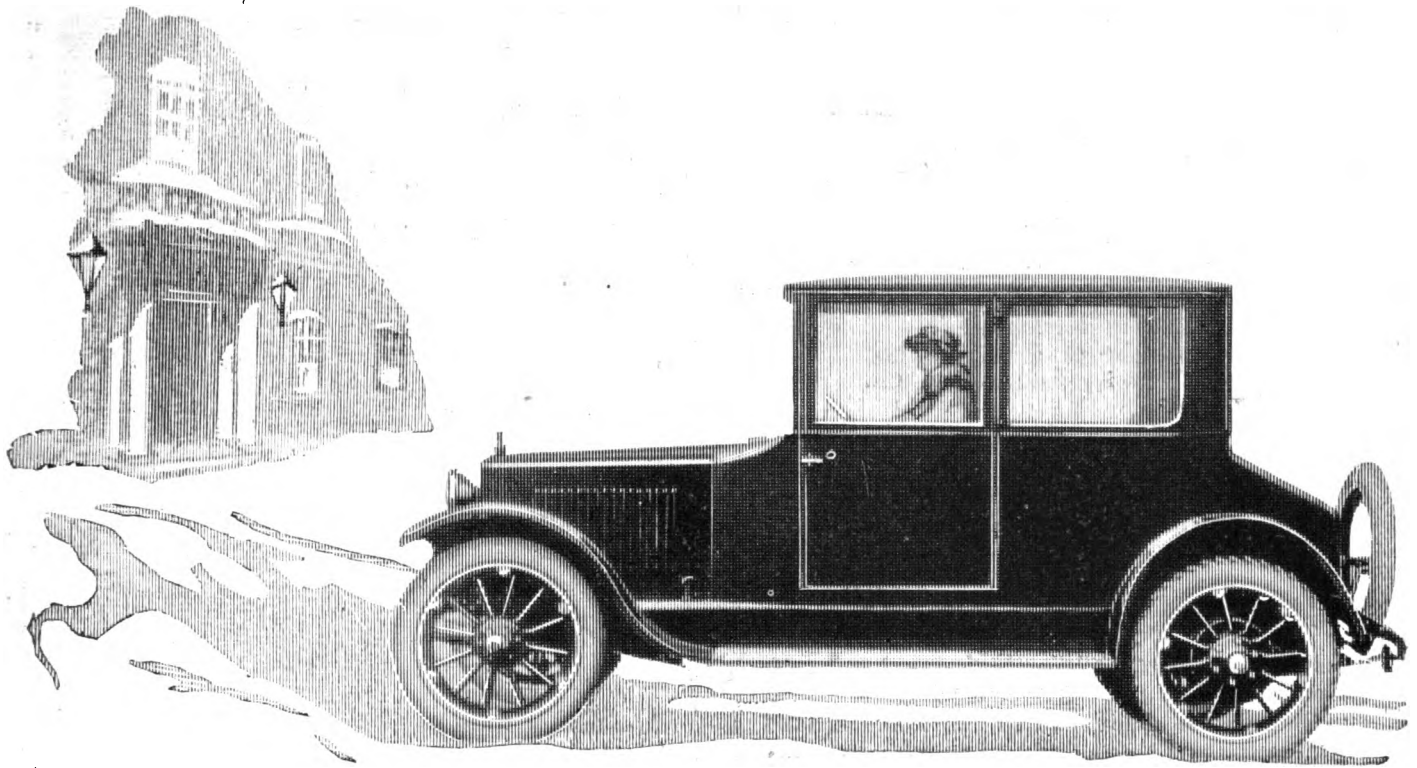
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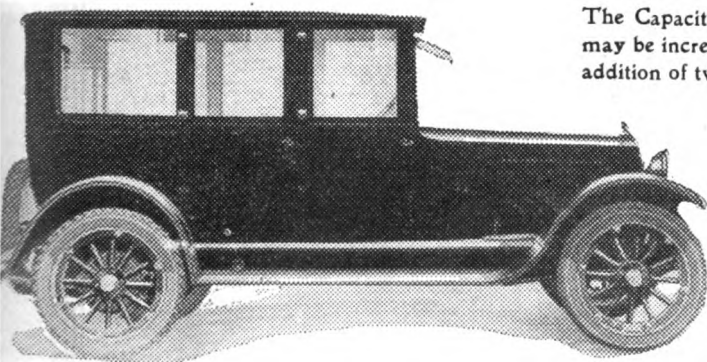
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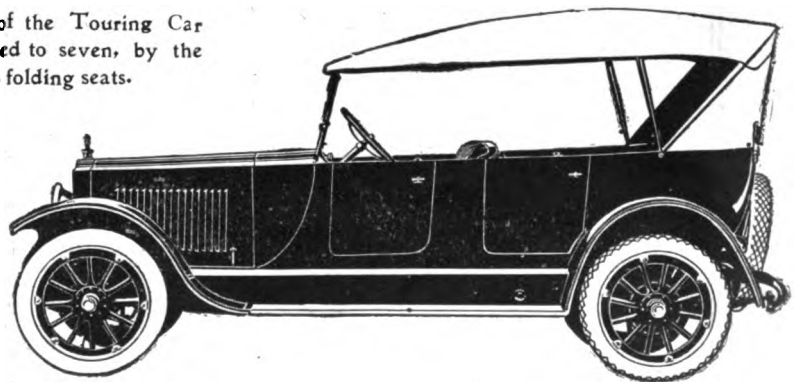
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# AUTOMOBILE JOURNAL

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is the guaranty behind the Yale-Geiszler Storage Battery. To the customer this means that if the Battery fails to deliver satisfactory service at any time during the *year* and a *half*, any authorized Yale Service Station will repair it FREE.

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10 a. m. to 10:30 p. m. daily  
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***World's Largest Display  
Of  
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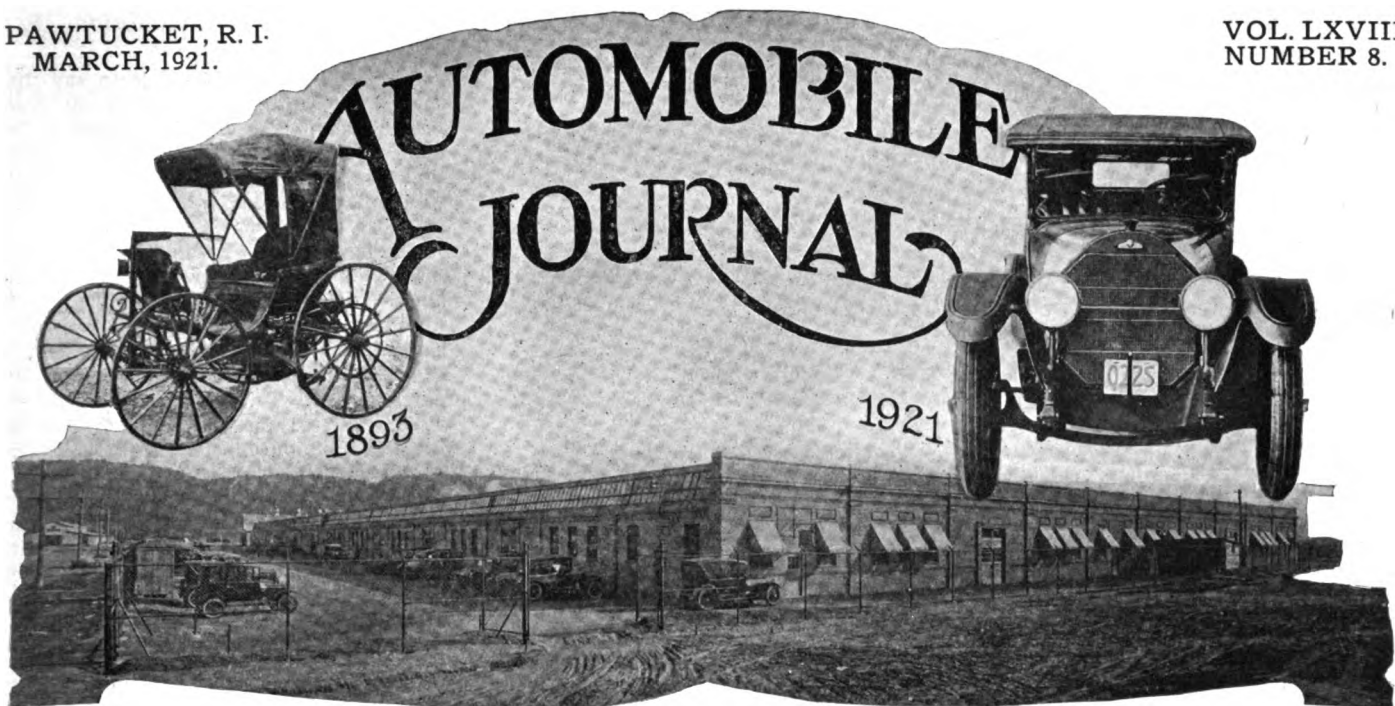
**Brilliant Exhibit of Closed Cars  
In Ballroom of the Copley-Plaza Hotel  
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**Magnificent Decorations  
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## Manufacturing to a Principle

**STEVENS DURYEA CONTINUES ESTABLISHED POLICY OF BUILT-IN QUALITY  
RATHER THAN QUANTITY—TRADITIONAL INDIVIDUALITY EMPHASIZED  
BY DESIGN AND MECHANICAL PERFECTION OF MODELS.**

(By S. G. SWIFT.)

**E**MPLOYING the same painstaking methods that have made its mechanical perfection a tradition, and still building around a principle, the New England craftsmen who have made it famous for 20 years are recreating Stevens Duryea as a jeweler places a valuable gem in a modern setting, and are holding it up to the eyes of the world as the mature expression of original ideas.

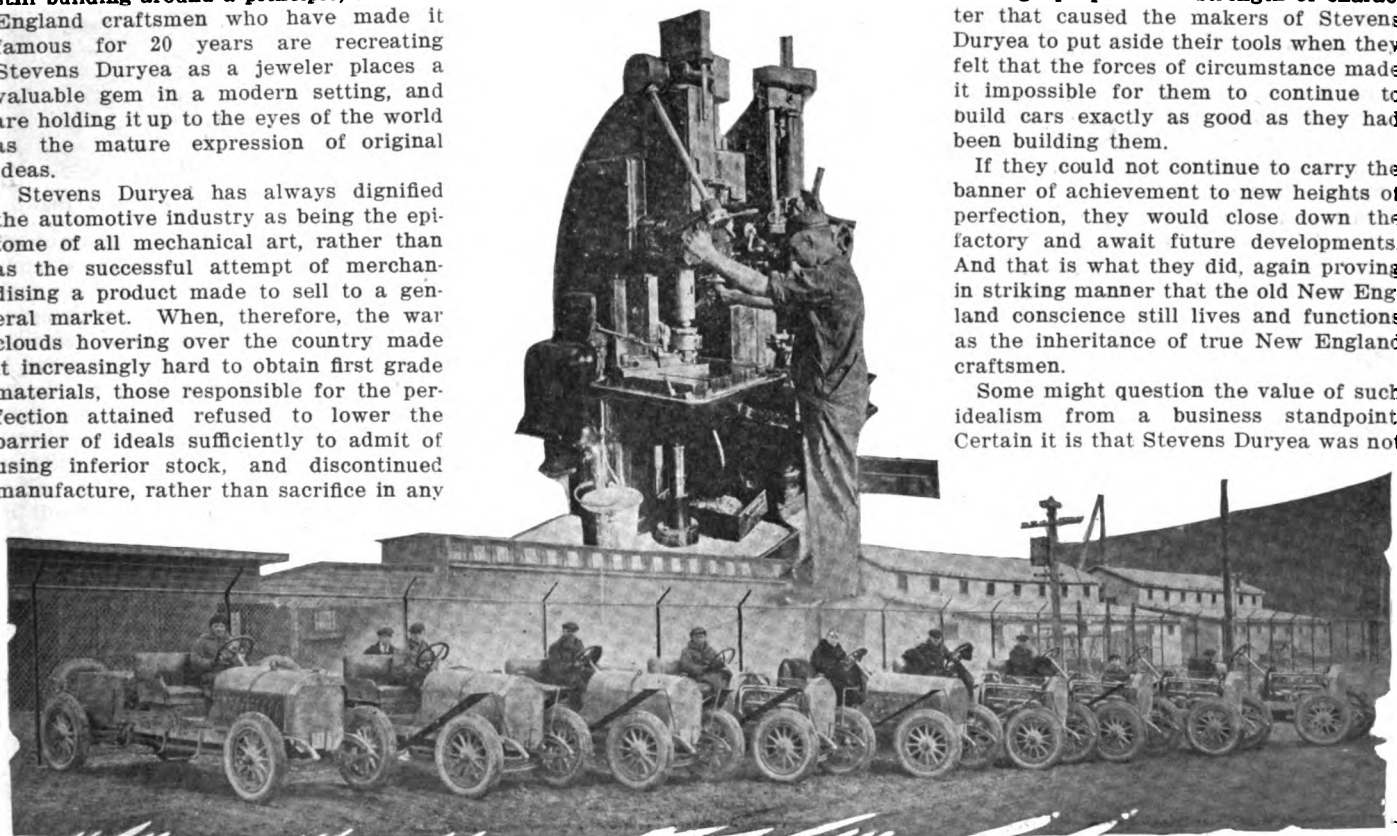
Stevens Duryea has always dignified the automotive industry as being the epitome of all mechanical art, rather than as the successful attempt of merchandising a product made to sell to a general market. When, therefore, the war clouds hovering over the country made it increasingly hard to obtain first grade materials, those responsible for the perfection attained refused to lower the barrier of ideals sufficiently to admit of using inferior stock, and discontinued manufacture, rather than sacrifice in any

measure the high standard that has ever characterized the Stevens Duryea car. Just how much at variance this step was with modern business methods, he

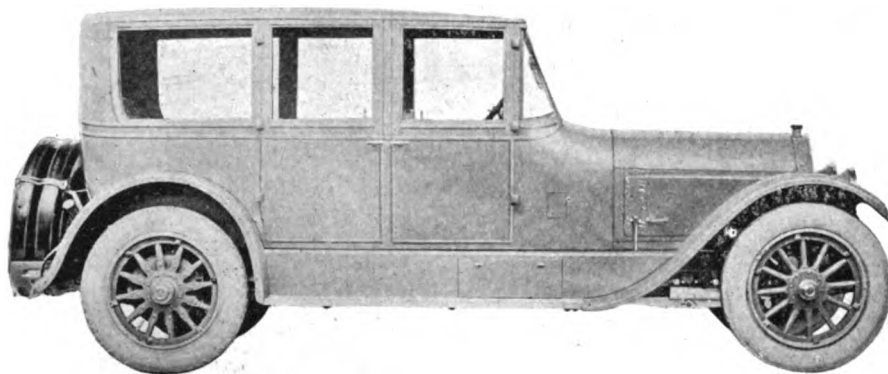
who reads may judge, but the discriminating buyers who demand the best in quality and refinement can appreciate the high purpose and strength of character that caused the makers of Stevens Duryea to put aside their tools when they felt that the forces of circumstance made it impossible for them to continue to build cars exactly as good as they had been building them.

If they could not continue to carry the banner of achievement to new heights of perfection, they would close down the factory and await future developments. And that is what they did, again proving in striking manner that the old New England conscience still lives and functions as the inheritance of true New England craftsmen.

Some might question the value of such idealism from a business standpoint. Certain it is that Stevens Duryea was not



A Type of Milling Machine Employed in Stevens Duryea Construction—Testers About to Start on the Usual 500-Mile Road Test.



**Rich in Its Simplicity This Luxurious Limousine Is Especially Roomy.**

thinking of future financial remuneration when it stopped production, but it has paid even from this standpoint, for now that the company is again manufacturing, the product is sold before it is finished to former customers, many of whom have driven the cars manufactured by Stevens Duryea for nearly 20 years. All of which is tribute of the highest type. The Stevens Duryea factory, equipment and executive and mechanical

ers. More than 600 on the list, which read like the Social Register, replied with assurances of best wishes for the company's success, several going a step further and asking the earliest possible deliveries of the car which still holds first place in their esteem.

#### **Organization Exemplifies Value of Individuality.**

The personal note predominates, to the exclusion of all that is stilted and ceremonious throughout the entire organization the officers of which are all young men. There are no private offices in the new plant, and the president, other officials, clerks and stenographers, all occupy one unusually large, well appointed office, which isn't partitioned off by so much as a fancy railing.

If the head of the company wishes an audience with one of the numerous executives, he doesn't send in a long distance telephone call, nor dispatch a lagging office boy. He simply raises his voice a degree above the conversational pitch and calls for "Jim" or "Harry," or whoever he wants to see. Someone responsible for the high plane of efficiency on which this company operates has an inherited sense that tells him the danger of submerged identity, and the value of the personal touch. There aren't any gold liveried funkies to take one's card into a plate glass office, and one need not cool his heels while waiting for an audience. The different officials can be seen and he doesn't have to wait. All of which makes him, unconsciously perhaps, spread the gospel of Stevens Duryea.

Every one of the several executives is a business man, first, last and always.

and it is pleasant to be able to say that the entire personnel appears to have been hand-picked for the work to be done. They measure up to the standard that is Stevens Duryea in a manner that would have pleased the founders of the business.

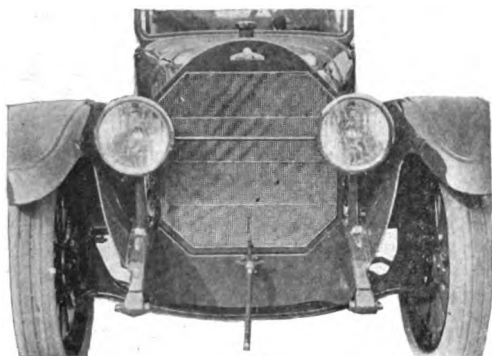
The officers are: President, R. S. Deering; vice president and general manager, G. M. Berry; treasurer, M. R. Leathers; the department heads—sales and advertising departments, P. W. Hine; service and parts departments, R. T. Jenks; chief engineer, T. L. Cowles; factory manager, George Braithwaite; purchasing department, H. S. Beebe.

All of these men are practical automobile men of experience in the manufacturing and marketing of high quality cars, and Stevens Duryea, already rich in the assets of tradition, is the richer by their connection with the company.

#### **Unusually High Type of Mechanics.**

One cannot pass through the factory without noticing the very high type of mechanics who build the car. These men are New Englanders, born and bred and practically all of them have been identified with the various manufacturing interests for which the section in which the factory is located is famous, nearly all of them having worked for Stevens Duryea for many years.

New England craftsmen they are, with the prestige that such characterization carries with it, and they take pride in working on such a high class product. "Tolerances," so called, which are frequently the rule in other factories, which



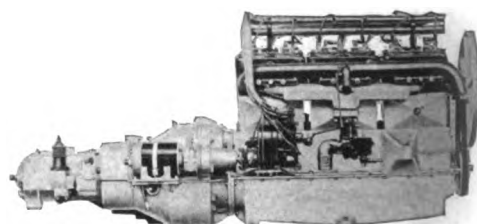
**The Radiator Insures Ample Cooling Surface.**

personnel, are geared to give the ultra in workmanship, finish and appearance. Each mechanic is carefully selected for his special fitness and ability to perform some allotted task. The high quality of men and materials emphasizes the fact that Stevens Duryea cars are made to supply a demand on the part of those who are financially able to purchase automobiles that are wholly distinctive, that have individuality, and which are sold at a price in keeping with the recognized values of this high grade product.

#### **Former Patrons Offer Potential Market.**

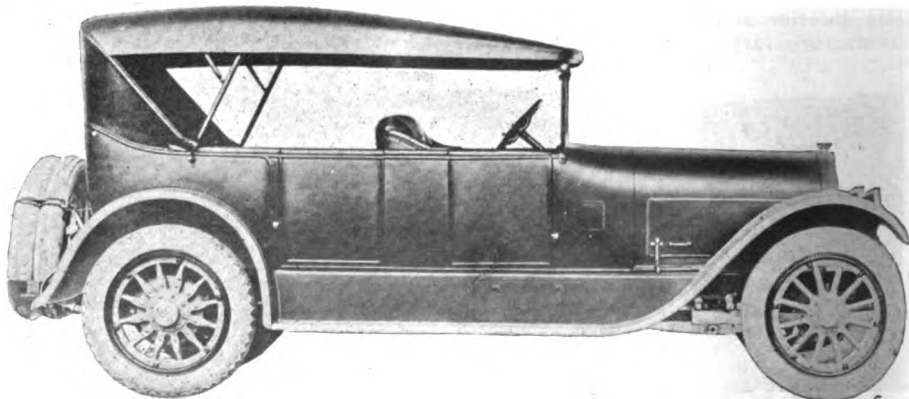
The house of Stevens Duryea gets a flying start in its merchandising campaign through having a following of satisfied former buyers as its best advertising medium. These patrons of other days have lauded the satisfactory performance and general worth of the car to friends, and the message has been relayed from point to point in a manner that has assured the future sale of all the cars that can be produced.

The potential market thus formed simplifies to an extent the distributing of the new product. As a proof of this fact the writer was much interested in being allowed to review the answers to a form letter recently sent to 1000 former own-



**Right Hand View of Power Plant.**

in the phraseology of the layman means "good enough," don't go with the mechanics. There is no hit or miss in the way in which they go about the different operations connected with the manufacture of the various parts. Everything must be sized to an exact dimension or it is discarded.



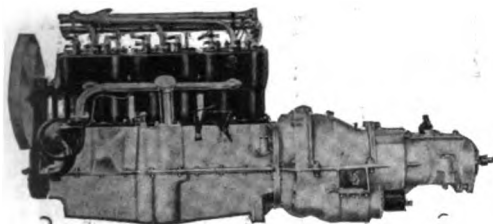
**The Touring Car Commands Attention.**

These men are thorough going machinists, because of an instinctive heritage handed down from the rock-bound hills of their native New England, which has ingrained in them a desire for nothing short of perfection, and they are faithful to that instinct. The result of this is seen in the work turned out, which, fortunately, in comparison with some so-called modern methods is distinctive in that it is old fashioned. And if one not versed in the ways of modern manufacture wishes further definition, let him compare some of the fine old cabinet work of other days with that which is currently offered, and he will get the connection in its true intent. The workmen are primarily responsible for the individual, or personal element which constitutes the chief charm of Stevens Duryea cars.

#### New Plant Thoroughly Modern.

When it was decided to resume the manufacture of Stevens Duryea cars the officials of the company decided that a new factory was necessary. The old one had been good enough for the times, but efficient manufacture demanded larger and better quarters, and eventually a 32-acre plot of land, midway between Springfield and Holyoke, in the city of Chicopee, was purchased, and a one-story brick and steel building erected. This structure contains all that is modern in the way of machines and equipment. It is 600 feet long by 310 wide and has a roof of saw-tooth construction which admits of ample light.

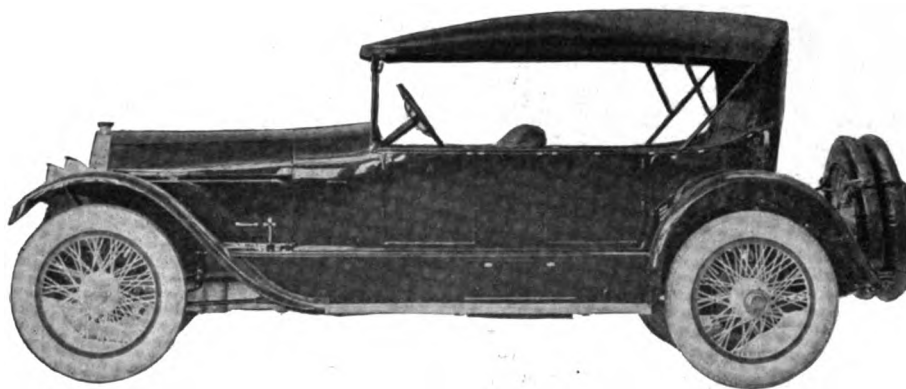
It is heated with a vertical tube boiler



Left Hand View of Power Plant.

that works in conjunction with a Carrier air conducting system, which washes and purifies the hot air as it leaves a battery of radiators. This air is distributed through long radiator pipes to the different departments. The system is also adaptable for summer weather, and will insure a supply of artificially cooled and washed air through the warm months.

The main office occupies the entire end of the building and offers an interesting



The Well Balanced Four-Passenger Close Coupled Sport Touring Type.

perspective as one glances the length of it, appearing to come together at the far end. This office, while well appointed is not elaborate, as the company considers that all unemployed assets should be built into the product, and one cannot but agree with the idea.

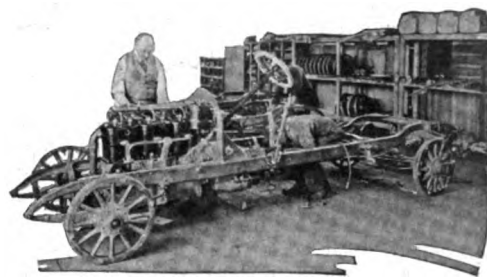
All of the machines are located in the main building with the exception of those used for nickeling and case hardening, which with the blacksmith shop and dynamometer room, are housed in a smaller building at the rear of the plant. The location, which is about two miles from the former factory, was decided on as being central to Springfield and Holyoke. the population of both cities contributing its quota of machinists, upholsterers and decorators to the personnel of the plant.

#### All Bodies Custom Built.

The body department naturally plays an important part in turning out the yearly production of 1000 vehicles. This department builds and finishes each body in an individual style and manner. Divided for the purpose of this article into classes, the types manufactured are the touring car, vestibule limousine and the touring sedan. An open sport model has also been developed which has all of the comfort noted in the others combined with the snappy, sporting features for which there is a certain current demand.

One of the most important features seen in the new Stevens Duryea is the provision for comfort. This is provided for through design, and furnishing, in large quantity, the essentials that make for comfort. Deep upholstery and thick backs, upholstered to support the full length of the back, take fatigue out of the longest journey. This, coupled with long wheelbase and extremely flexible

springs, makes the riding qualities of this car truly remarkable. It is in attention to these details that craftsmanship reaches its highest level. Everything that can make for comfort and long life to the product has been carefully worked out. The broadcloth used for the seats and cushions is specially designed and manufactured. It has the charm of individuality, in that Stevens Duryea controls the patterns for making



The Chassis in the Assembling.

it, and also has the added asset of long service and wear.

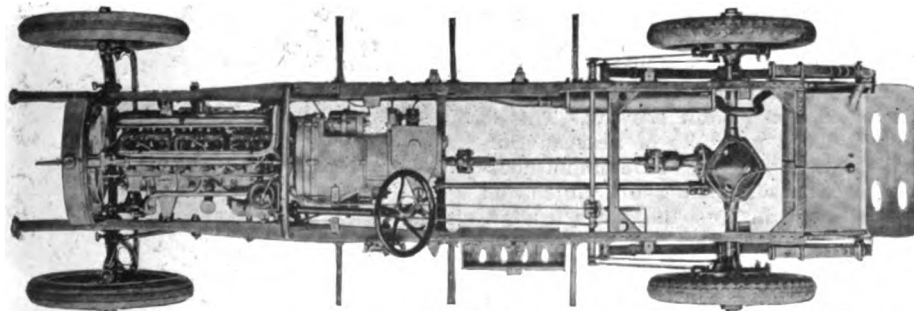
Where the upholstery is of leather, only the best of carefully selected and treated hides are used, and there is no such article as split leather in the whole department. Nothing but the finest quality of curled horse hair is used in the upholstery, and the spring suspension of the seats is of the finest coil steel, especially manufactured for use on exclusive designs.

#### New Cars Built with Aluminum Bodies.

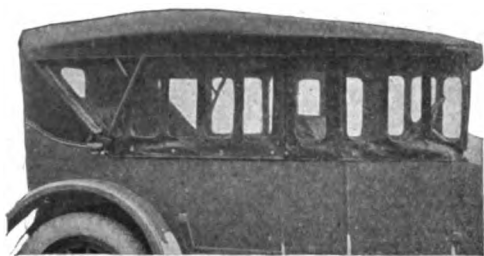
The frames of the different types manufactured are all of carefully selected materials, and the body metal is aluminum. Metal trimmings for doors and windows, and door locks and hinges are all cut from the raw material and made by hand. There isn't a piece of sheet metal in the body of the car, with the exception of the aluminum, all other parts being cut from heavy gauge stock, which is somewhat unusual when one looks at the trim and finish on the ordinary car in comparison.

#### Tops Hand Tailored to Each Automobile.

The top making department is situated next to the space allotted to the body builders, as the two work in conjunction. Every top seen on a Stevens Duryea car was tailored to that particular job. Strictly speaking it was tailored onto the



The Accessible Assembled Chassis Ready for Attaching the Body



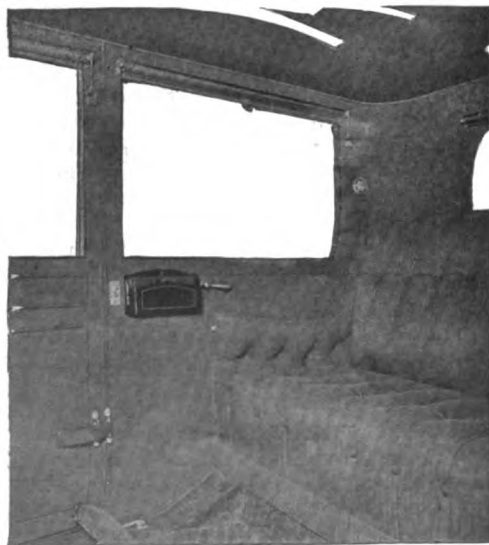
**Absolute Protection with Clear Vision.**

body, and is as much a part of it as though the two had been built as a unit. This department, equipped with 15 power driven Singer sewing machines, is staffed with men, many of them elderly, who have made a life work of the art, for art it is, of building tops, and they know their business. They are deliberate in their movements, take lots of time on the different operations, and the result is a top that actually fits without the slightest suspicion of a wrinkle.

#### **Bodies Painted with 14 Coats.**

Painting is the next step in the construction of the finished body. This work is in charge of a man who for 20 years has specialized in the painting of Stevens Duryea cars. There is only one satisfactory way to paint a body that shall measure up to the standards set by the company, according to this workman. The first operation calls for a thorough cleaning of the surface with steel wool and a solution in which gasoline is a base. This is followed by a metal primer coat. Coach body filler is next applied. The body is then treated to a coat of liquid putty, and when this dries, five coats of rough finish are laid on.

After this comes a coat of chrome yellow, which is scoured off when dry with pumice stone. This last treatment is the forerunner of two more color coats, which in turn are followed by three coats of color varnish, which is dried by natural heat in a specially constructed room kept at the exact degree of temperature necessary to dry the varnish



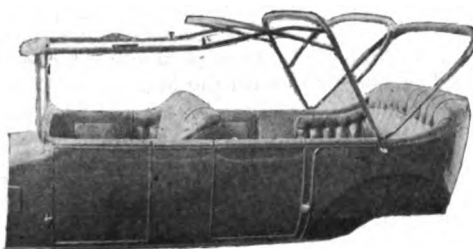
**Charm and Comfort Combined.**

smoothly. Another finish coat of varnish is given the machine after chassis and body have been hung up. And the result—a satin finish that defies the exploring finger to find a high spot in the entire surface of the car.

If the connoisseur of true art wishes to include a master of automobile painting in his list of notables—and there is every reason that he should—he has but to journey to the Stevens Duryea plant to find the man.

#### **Chassis Design.**

The chassis of the new car follows closely the lines of previous models, and such changes as have been made insure greater power and economy, together with improved riding qualities. The rear springs have undergone a



#### **How Top Bows Are Set for Covering.**

change, being  $3\frac{1}{2}$  inches longer than formerly, and three-quarters elliptic instead of half, thus giving extra action and doing away with small vibrations.

The throw is controlled by four Gabriel snubbers, and the result of these innovations is seen in the manner in which the car rides, as the body seems to hang at a dead level, the axles moving up and down with the action of the springs.

An inspection of the current model will at once disclose familiar Stevens Duryea characteristics. Although low and strictly modern in its lines, the body still retains many features noted in former models, such as for example, the high seat backs, straighter than many others, the molding, back of the rear doors, and the leather covered trimmings. The radiator, the five-spoke steering wheel, the left hand gear shift and brake lever, leaving the center of the front compartment unobstructed, the six-cylinder motor, the unit power plant supported at three points, the multiple dry disc clutch—all are essentially Stevens Duryea.

#### **Engine Shows Several Refinements.**

In 1904, the unit power plant supported at three points, first adopted in 1897, had been developed to the point of completely enclosing the engine, clutch and transmission in a rigid unit housing. This is today a basic principle of Stevens Duryea design, and the rigid aluminum housing that encloses crank shaft, clutch and transmission, insures the perfect alignment of their bearings at all times and under any road conditions.

The entire unit is flexible with respect to the frame and practically independent

of it. The engine always delivers the maximum percentage of its power to the rear wheels because sources of loss, such as flexible joints between engine clutch and transmission, bearings out of alignment, twisting caused by unevenness of the road and squeezing of the lubricant from between the cramped surface bearings are avoided.

The multiple dry disc has been a Stevens Duryea advantage since 1904. This clutch is compact, indestructible and requires little or no adjusting. It releases instantly, allowing perfect shifting of the gears. It takes hold positively but gently, reducing the strain on every part of the driving mechanism, lessening tire wear and adding immeasurably to the comfort of the passengers.

Stevens Duryea is said to have brought out the first American six in 1905. It was a complete success from its inception, and demonstrated again the far sighted wisdom of building around a principle.

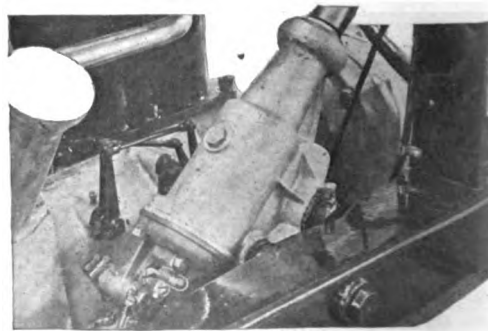
That the six-cylinder principle holds as good today as ever, is witnessed by the fact that it has successfully withstood the recent tendency to increase the number of cylinders. With the admitted advantages of fewer parts, lighter weight, perfect balance and greater accessibility, continued six-cylinder supremacy, as exemplified by Stevens Duryea is not surprising.

The model E power plant is fundamentally the same as the model D, which has proved itself all the most exacting owner could wish, with its smooth, quiet



**Side Curtains Protect Rear Seat.**

power, instant responsiveness to the driver's every whim, delightful flexibility and quick acceleration. Numerous refinements, however, have made the model E power plant even more power-



**Full Ball Bearing Steering Gear.**



ful and flexible, and there is a marked economy in gasoline consumption.

The ignition is a two-spark magneto system. Two hot sparks simultaneously ignite the mixture in each cylinder in two places at once. The complete charge is burned and its full expansive force utilized. None is wasted by sluggish or incomplete combustion. Quicker acceleration, smoother running at low speeds and greater efficiency results.

The highly perfected type of carburetor is especially adapted to present day fuels. This is coupled up with a short intake manifold, heated both by water jacketing and hot exhaust gas, the latter being controlled by the amount of throttle opening.

The exhaust manifold carries the hot gasses down at the front of the engine and thence underneath the car and away from the floor boards instead of back immediately under them, as is the usual practise in many types of motor vehicles.

The cooling water is thermostatically controlled, keeping the engine constantly at an efficient temperature. A motor on the instrument board registers the temperature of the water leaving the water jackets.

Starting and lighting are provided for by a two-unit system. The starting unit of ample power, insuring rapid spinning of the motor, is operated by a convenient button on the control panel.

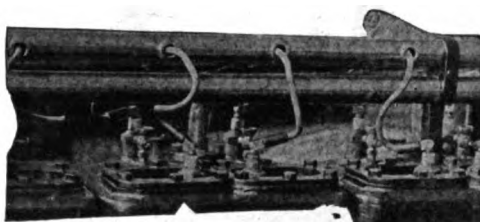
A most important advantage of Stevens Duryea construction is the square and

responsible for the long life of Stevens Duryea motor cars. The component parts fit so perfectly and are so absolutely united by this form of construction, that, in effect, the crank shaft turns the rear wheels directly.

The same sturdy and reliable steering gear is employed. It is so smooth and easy acting that the car may be swung quickly aside with one hand.

#### All Steel Forgings Tested for Tensile Strength.

The raw materials that go into Stevens Duryea cars are the best that money can buy. The essential advantages of the steels used is that practically all such steels are of special alloy and heat treated, a sample of each piece being subjected to the most searching physical and chemical tests. The use of



High Tension Wires Carried in Tube.

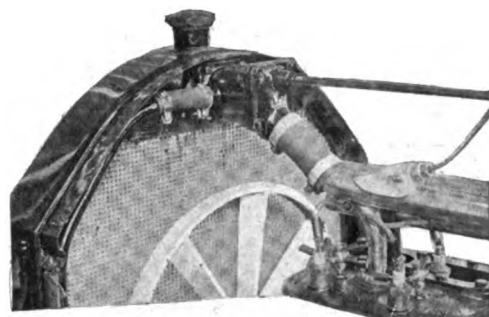
such steel gives greater strength for a given weight than can otherwise be obtained. In the use of all other materials no compromise is permitted at any point—only the best will suffice.

A well earned reputation for quality is something that requires eternal vigilance if it is to be lived up to, but it builds service into every car. Getting good steel isn't merely a question of paying a good price for it, and then trusting to the mills to furnish a quality product. The human element enters into a transaction of this sort, and for that reason eternal vigilance on the part of the purchaser is the only way in which quality can be assured.

It doesn't look like good practise to buy expensive steel forgings and then, after going to the expense of testing it as described, further guard the quality by cutting away anywhere from 25 to 80 per cent. of the piece to produce the finished part. But absolutely sound and flawless material is only found at the heart of the forging, and all such parts, machined to a finely finished master pattern, lose much of their original weight in the process, which is merely another one of the many ways in which the company seeks to attain perfection.

#### Multiple Machine Operations Not the Rule with Stevens Duryea.

The machine shop is one of the distinctive features of the plant. The system, followed in many factories, of completing a part by multiple operations doesn't obtain. The company believes that the only way by which parts can be machined to exact measurement is by the single operation, and all machines are designed with this feature in mind with the single exception of the Bausch mul-



Thermostatic Control a Desirable Feature.

tiple drill, which bores all the bolt ways in the aluminum crank case at one operation.

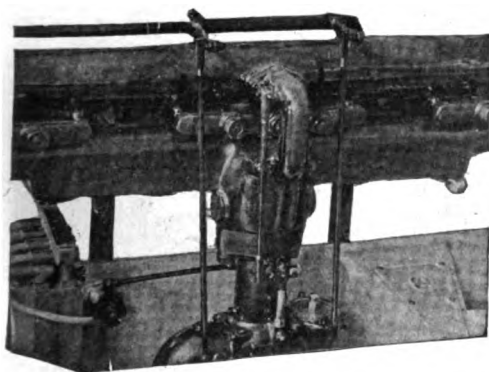
One out of every three parts, large or small, that go to make up the mechanical unit of Stevens Duryea cars is inspected, and never was test more rigid, nor closer limits set. Delicate instruments scaled to measure one-tenth thousandth of an inch, quickly detect the slightest variation from standard requirements, and the system of passing small parts that show a measurement just under or over the limits set is not allowed. Every part must be exact, and this is one of the basic principles that make the assembled engine need very little adjusting, the different moving parts functioning perfectly. As a matter of fact there are very few rejections by the inspecting department as the workmen exercise unusual care, and the process, or method, of machining in single operations also keeps the discard rate low.

#### Cylinders Ground to Closeness of .0002 of An Inch.

In looking at the different operations the writer was especially interested in the process of cylinder grinding. This work is done on a Heald style 65 cylinder grinder, and the work produced is undoubtedly the equal of any commercial cylinder grinding job done anywhere. A workman who has specialized for 20 years in the work has charge of the delicate operation, which attains a closeness of .0002 of an inch for diameter.

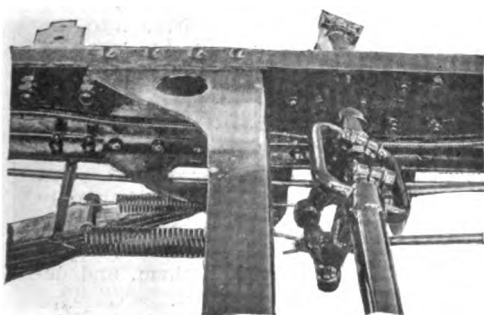


Springs and Upholstery Ident.

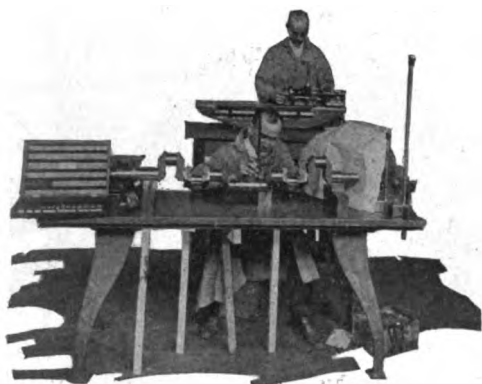


Intake Manifold Heated by Exhaust Gases.

taper square connections in the drive line, which eliminates keying together the different units through which the rear wheels are driven and avoids wear or twisting or shearing of these important parts, and this principle is largely



Simple and Effective Brake Equalizers.



Final Inspection of Finished Crank Shaft.

The method of measuring for accuracy is by means of a dial indicator, which is kept, when not in use in a master cylinder, which allows the operator to keep the instrument set at an exact figure. The finish obtained is far superior to that seen in many operations of similar nature, and is as near perfect as it is humanly possible for it to be.

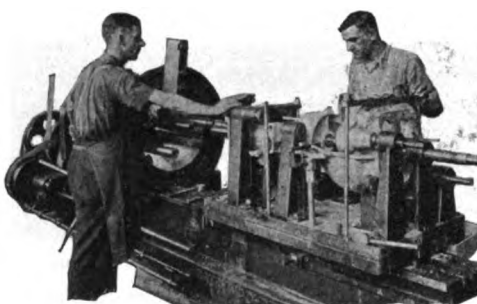
Another operation that is of unusual interest is that of fly wheel balancing. The wheel balanced on knife edges, is bored and rebored on the back side until it exactly balances, and when exactly true will not turn so much as a quarter inch from any position. This is merely another small detail in the whole that Stevens Duryea does to attain the extreme

which lays out the work in such manner that no one department produces a greater proportion of work than another. This department knows at all times just what each department is doing, and while of recent inception, has already worked to a decided advantage for all concerned.

#### Multiple Tests Assure Satisfactory Performance.

The layout of the machine department is ideal in that all parts work through the different operations in a straight line to the engine and chassis assembly departments, which work in conjunction with each other.

The engine assembly is one of the most carefully conducted operations in a factory where extreme attention to de-



All Main Bearings Are Lined Up by Special Machine.

tail is paramount. Only men of long experience, with general all-round knowledge of the business are allowed to work in this department, which is fitted with many special features which make for precision. The various parts, after assembly, are placed under a belt and are "lapped in" by running in a bath of oil. When the parts have become properly seated the engine is mounted on cement blocks, as shown in the illustration, and coupled to an electric dynamometer is run under its own power for 24 hours.

Following this test the bearings are tightened, and any minor adjustments necessary are made. The chassis is then mounted on test tires and a test body is

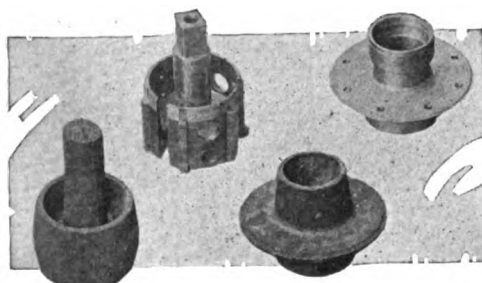


Inspecting Flywheel for Balance.

placed on the car, which is then ready for a 500-mile road test.

#### Tester Is Aristocrat of Automobile Mechanics.

The tester is the aristocrat of all automobile mechanics. He knows all there is to know about handling new cars, and must necessarily be familiar with every part of the machine. He has a seeming sixth sense which has been developed by years of close attention to the business, and is a veritable wizard at detecting any slight irregularity in the performance of his machine. He knows the meaning of the slightest vibration which is not as it should be, and can tell to

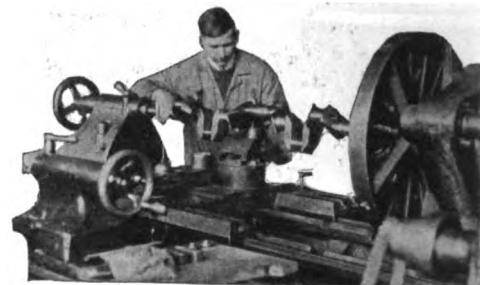


Rough and Finished Forgings Show Material Removed in Machining.

in mechanical perfection, and is characteristic of all that the company does.

#### Production of Each Department Centrally Controlled.

The production of the factory is controlled by a centrally located department,

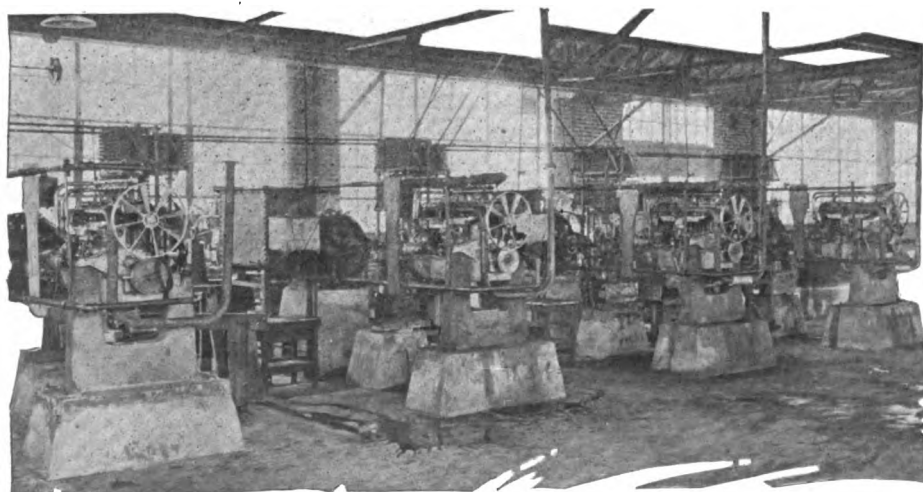


How the Crank Shaft Is Machined.

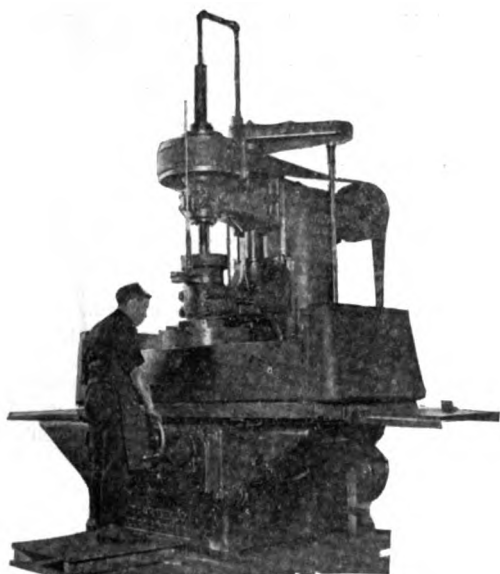
the instant just how near perfect the timing is.

These men, with their odd looking machines, the body of which, as seen in the picture, closely resembles a racing car, think nothing of weather or road conditions, and drive the full 500 miles over country that at times would try the courage of men of lesser experience. They make practically all adjustments en route, and when they drive into the factory yard at night, mud splashed and tired from a strenuous day, there is nothing much to be done to the machine in the way of adjustments. A few bearings to be tightened the least bit, perhaps, or some slight spring corrections, but otherwise the engine is mechanically perfect, for these testers know their business. They work hard to deserve the faith which is reposed in them, and deserve all the credit they get.

After returning from its 500-mile trial trip the test body is removed and the chassis cleaned. It then gets its color

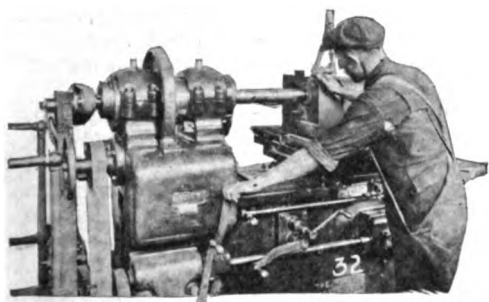


Department Where Engines Are Tested by Dynamometer in Groups of Ten.



Cylinders Finished to .0002 of An Inch.

varnish, after which it goes to the "hang-up" department, where it is attached to the body. Here, at its best is seen the result of the production control, for so closely has each operation on both body and chassis been figured that the finished body and the finished chassis come to the hang-up department simultaneously, both having been completed at the same time. The work of hanging the two units is accomplished very handily by means of a



Special Labor Saving Grinding Machines.

padded hoist, and the car is then road tested for a final time. The finished job is then ready for its final coat of varnish and the final inspection as a finished product. Tire racks, floor coverings, lamps and other accessories are attached at this time, and the machine is ready to be sent to the dealer, though, as a matter of fact, most of the cars produced thus far have been driven from the factory by their owners. The writer recalls the instance of an eager purchaser who came on from a distant city and spent three days in Springfield waiting for his new sedan. He was only too glad to get delivery in that time and said as much when he left for home.

#### Extreme Care Exercised in Appointing Dealers.

A Stevens Duryea dealer's franchise is recognized as a distinct asset by the better class dealer, who considers himself fortunate in being associated with an enterprise which has established and conformed to the high standard set by this company. The company in turn, believes

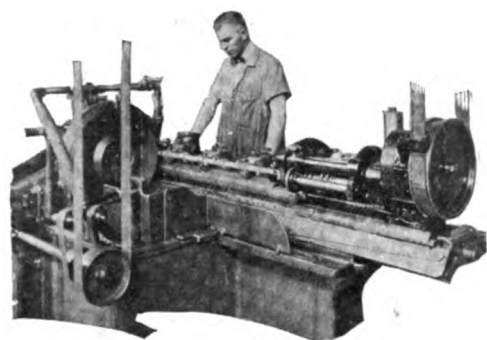
emphatically that a high grade car must be distributed and sold by a high grade dealer, and that success, to be permanent, depends largely on proper and dignified representation.

Regardless even of unusual sales ability, dealers appointed must be men of the highest standing. With the unusual demand for territory it has been a question of selecting the proper dealer, as a dealer once accepted must become a permanent part of Stevens Duryea.

All territories allotted are for the territory adjacent to the city in which the agency is quartered, and each agent is expected to work his field exhaustively, with the understanding that he can secure additional territory just as soon as result of his intensive sales campaign in the original field justifies. The franchise issued by the company is unique in that it has no cancellation clause incorporated. It differs from some also in the handling of small dealers, each of whom gets a contract direct from the factory, instead of from the distributor in whose territory he may be located, and thus practically does away with the sub-dealer.

The advantage of this to the smaller dealer is obvious, as it offers unusual protection. It also is of value to the manufacturer, serving as an important factor in centralizing control of the business. To further centralize the control of the business and to assure all customers of the same courtesy and fair treatment when touring through a territory other than the one in which they purchased their car, all dealers are obliged to sign an agreement to give Stevens Duryea service to all Stevens Duryea owners, regardless of where their car was purchased.

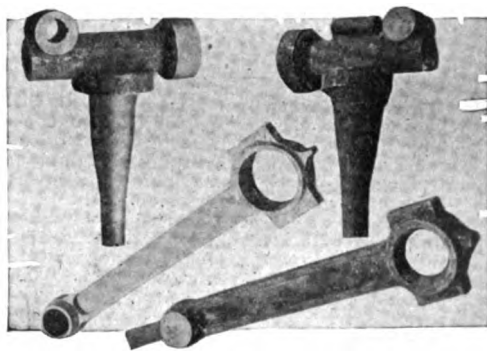
The paramount idea of all sales programmes adopted by the Stevens Duryea company is to assure closer cooperation between the factory and the owner, and to develop the personal note, sounded in



Grinding Cam Shaft Is Very Particular Operation.

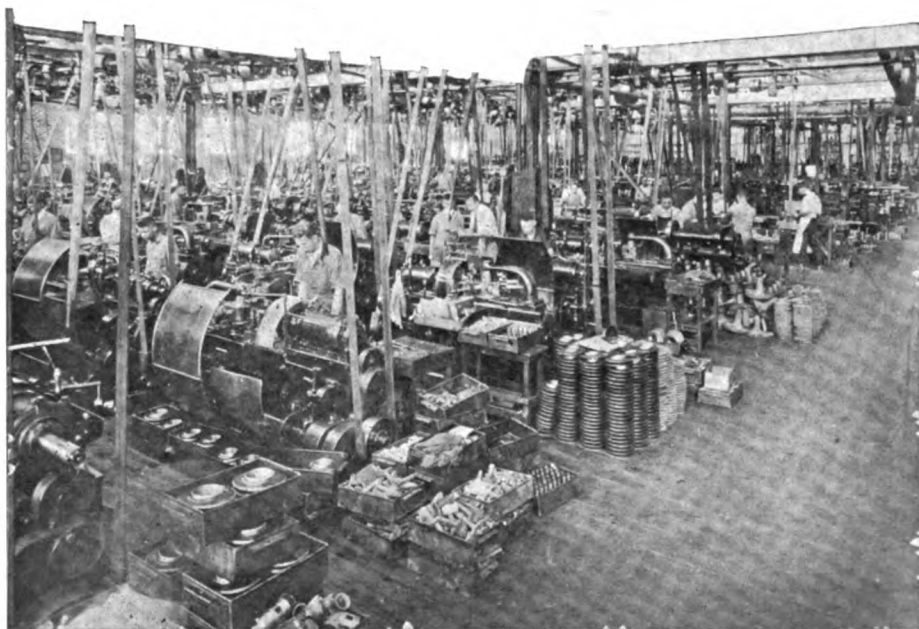
all that the company says and does, to the highest degree of harmony.

With this in mind, as another contributing feature, the company is preparing to list all retail purchasers each current month alphabetically and chronologically, and send these to every distributor.



Note Test Pieces on Ends of Rough Forgings.

This will make it possible for the dealer in Texas to greet by name the tourist from Massachusetts, and this ideal plan, which assures courteous treatment, is a strong link in the chain of service helps which the company has inaugurated, all of which tend to make one large family of Stevens Duryea, its dealers and customers. The trade name, Stevens Duryea, long identified with the manufacture of



A Corner View of the Splendidly Equipped, Lighted and Ventilated Machine Shop.

fine cars, has taken on added dignity with being identified as a method for merchandising a product, and the correlation is a happy one.

Success in the automotive field is gained by hard work, study and experience, linked with good and careful judgment. It is the result of constant striving, year after year, for progress along well defined lines of endeavor. The present status of Stevens Duryea is the cumulative result of almost a quarter century of the same striving that has been responsible for every great success, and is representative of the attainment of the highest ideals. The same honest purpose to achieve and maintain a reputation for leadership which has thorough going excellence as its foundation, and lasting worth as its true aim has produced a car that is representative of the ideals of Stevens Duryea—a product that is substantial and unpretentious, a true aristocrat of the motor car world.

### SPECIFICATIONS IN BRIEF.

**Engine**—Horsepower: 47.4 (N. A. C. C.). Cooling: Six, cast in pairs; L head type. Bore and stroke: 4 7/16 inches by 5 1/4 inches. Lubrication: Pressure and splash; oil circulated by gear pump in lower crank case, pressure gauge on dash.

**Cooling System**—Centrifugal water pump and belt driven fan; cellular radiator and large water jackets; thermostatically controlled circulation with dash motometer to indicate engine temperature.

**Ignition**—Magneto and battery; two spark magneto and storage battery for starting.

**Carburetor**—Latest type with dash control for easy starting and atmospheric adjustment.

**Fuel Supply**—Vacuum feed; 25-gallon tank on rear, including 3-gallon emergency reserve.

**Controls**—Spark and throttle levers on sector above steering wheel; foot throttle; clutch and brake pedals adjustable; hand brake and gear shift levers on left side.

**Clutch**—Stevens Duryea, multiple dry disc.

**Transmission**—Three speeds forward and reverse; ball bearing; Stevens Duryea patented self-finding quadrant (impossible to mesh wrong gears in shifting).

**Drive**—Shaft; two universal joints; spiral bevel drive gears; torque tube takes driving torque.

**Electrical System**—Two-unit 6 volts; starting motor pinion magnetically shifted to engage teeth on flywheel; starting switch on dash. Powerful motor spins engine 130 revolutions per minute. Generator constant voltage type with current regulator.

**Battery**—120 ampere-hour carried on left side in case between running board and frame.

**Front Axle**—Drop forged, I beam section; special heat treated steel, ball bearing steering spindles.

**Rear Axle**—Full floating; ball bearing; nickel steel axle tubes and driving members; drop forged differential housing.

**Brakes**—Service: Contracting on rear wheels; asbestos fabric lined. Hand: Expanding on rear wheels; bronze shoes on wheel drums.

**Steering Gear**—Semi-irreversible, hardened and ground steel worm and sector; ball bearing; eccentric adjusting bushing.

**Springs**—Front: Semi-elliptic, 40 inches long. Rear: Three-quarter elliptic, 57 1/2 inches long, underslung on rear axle.

**Lubrication**—Alomite system through-out chassis.

**Wheels**—Artillery type, wood. Wire

wheels optional at extra cost.

**Rims**—Quick detachable; demountable.

**Tires**—35 inches by five inches straight side cord; rib front, non-skid rear.

**Tire Pump**—Power driven from transmission.

**Tire Carrier**—Rear of car for two tires or wheels; Yale locked.

**Wheelbase**—138 inches.

**Tread**—56 inches.

**Standard Trimmings**—Open car: Nickel; upholstered with the finest quality black hand-buffed, hand boarded leather; hand-buffed leather binding, tonneau carpet of finest imported English horse hair.

Closed cars: Brushed silver finish; upholstered in heavy broadcloth of our own exclusive patterns. Silk curtains, cords and laces and superior wool carpets in harmonizing colors.

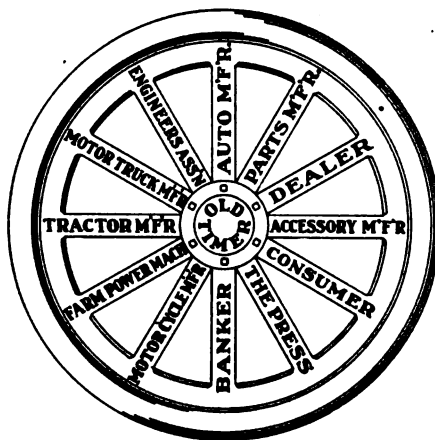
**Color Specifications**—Open car body, chassis, guards, bonnet, splash pans and radiator of the same color; wheels and striping in harmonizing colors. Closed car lower body panels, bonnet, fenders, running board shields, radiator and chassis of the same color; upper body panels, belts, striping and wheels of harmonizing colors.

**Options**: Brewster green light, sage brush deep, green gray deep, beige brown, coach blue light, coach blue medium, deep wine.

**Prices**—Model E chassis, \$7000; standard body styles: touring, \$8000; vestibule limousine, \$9500; close coupled sport (four-passenger), \$8000; touring sedan (four-passenger), \$9500. Custom body styles: Roadster, \$8500; town brougham, \$10,750; limousine, \$10,750.

## Old Timer's Emblem Suggested by Alvin

One of the most pleasing social features of Chicago Show Week was the



first annual banquet of the Old Timers' club, held in the Gold room of the Congress hotel. This organization was formed at the 1920 shows and grew during the year to a body of 6000 members without officers and with no set policy. At this 1921 banquet every available seat, 625 in all, was occupied. Congressman Clifford Ireland of Illinois was the toastmaster and the speakers included Elwood Haynes, who was made Honorary Member No. One; David Beecroft, Albert Champion, the newly elected president; Forrest J. Alvin of Cincinnati and Samuel E. Hibbin of Chicago.

Officers for the ensuing year were elected as follows: President, Albert Champion, Flint, Mich.; secretary, F. Ed. Spooner; vice presidents, Howard Marmon, Indianapolis; Martin L. Pulcher,

Detroit; John Younger, Cleveland; Gregory Flynn, New York City; W. L. Hughson, San Francisco; Thomas J. Hay, Chicago; C. G. Sinsabaugh, New York City; Richard Kennerdell, Franklin, Pa.; Alfred Reeves, New York City; Lloyd R. Maxwell, Chicago.

Headquarters have been opened at 420 Book building, Detroit, occupying a portion of the offices of F. Ed. Spooner, who is secretary and general manager of the organization.

### Old Timer Emblem Suggested.

Forrest J. Alvin, general manager of the United States Motor Truck Co., Cincinnati, O., is the originator of a clever device which has been sent to the officials of the club as a suggestion for an emblem.

The design, as will be noted from the accompanying reproduction, is in the form of a wheel with "Old Timer" as the hub. The 12 spokes are represented as 12 important factors in the automotive industry, as follows: Engineers' association, Motor Truck Manufacturer, Farm Power Machinery, Motorcycle Manufacturer, Banker, The Press, Consumer, Accessory Manufacturer, Dealer, Parts Manufacturer, Automobile Manufacturer and Tractor Manufacturer.

### LOUIS DUSENBURY ENLARGES STAFF.

Louis Dusenbury & Co., Inc., 229-233 Fourth avenue, New York City, importer and manufacturer of upholstering materials for automobiles, carriages, air ships, etc., announces the following increases in its executive staff:

Louis E. Dusenbury has been appointed vice president and Harold W. Schwab secretary, these additions being made necessary by new production plans developed by the company which include the early presentation to the trade of an entirely new line of art motor fabrics. These new Dusenbury motor fabrics will apply the "Period" idea in a unique way to motor car upholstery, being interesting reproductions of the world's greatest decorative themes by the company's expert stylists.

The Dusenbury Co. is represented in Detroit with exhibition and sales rooms at 426 Woodward avenue, the main offices being located in New York City and factories in Bridgeton, L. I., N. Y.

Established in 1849, Louis Dusenbury & Co., Inc., has maintained a continuous business existence of more than 70 years, making it the oldest producer in its line in the country.

### INTERNATIONAL FAIR AT UTRECHT.

The First International Industrial Fair will be held at Utrecht in the Netherlands from Sept. 6 to 16 and American manufacturers and traders are invited to make representation.

The New York Chamber of Commerce for the Netherlands and the Netherlands East and West Indies (Inc), 44 Beaver street, New York, has been appointed as general representative in the United States.



# Great Boston Exhibition in Colorful and Gorgeous Setting

ON THE eve of the 19th Annual Boston Automobile Show, staged in Mechanics' building, March 12-19, the arrow points not only to one of the finest exhibitions ever held anywhere, but also one of the greatest get-together gatherings in the life of the industry.

A host of factory heads, the majority of sales managers, and engineering chiefs in great number will be present. The manufacturers will attend to get a first hand peep into the market situation. They will study the signs and, in addition to what may appear on the surface, will read between the lines and base their plans for future production on what their acumen and judgment tells them the show reveals as to public demand for their wares.

Many in the know predict that the production pace to be maintained from now on will depend mainly on the conditions of the market as disclosed at the Boston show. An attendance of at least 200,000 is counted on and the buying disposition and the interest shown by this large number is figured to be the barometer which will guide future operations.

"Indications are that more agents of motor cars, trucks and accessories will come to the Boston show than ever before," says Manager Chester I. Campbell. "This abnormal attendance of those vitally interested is due to the desire to get the real business conditions of the industry."

## Many Dealers' Meetings.

Distributors and dealers will also round up their selling forces for the

show. There will be meetings of the various distributing organizations and all out-of-town representatives will be on hand to imbibe the stirring atmosphere which this show always imparts. Dealers and salesmen will be fired anew for their task through the presence of the great crowds, a certain indication that the motor vehicle has lost none of its popularity and carries the same appeal as of yore.

There is no freight transportation tie up this year and there will not be a vacant space in the exhibition area. There will be 350 passenger car models on display, 87 makes. Also will be 236 truck models of 57 different makes. The motor accessory exhibits number 358. More than 100 prospective exhibitors were denied an opportunity to exhibit their products because of lack of space.

There are many indications that the Boston exhibition will lead all shows of the year as a buying vent, as well as in many other lines. Industrially New England is setting a pace for the rest of the country and this fact should prove potent for both the truck and car merchandiser. New England has long been a rich field for these units and will so continue.

Nobody expects that the auto industry is going to enjoy prosperity all by itself or that a thrilling selling season is before them but everybody in the New England trade is convinced that the motor car and motor truck are now accepted as an essential of life and that there will be a big market for them until

some better mode of personal and merchandise transportation is devised.

The year 1921 will be a transportation year, it is pointed out. Every business and every product is called upon to face its part in reconstruction. Efficient methods must prevail. People must have cars and trucks.

## A Record Truck Display.

Mechanics' building, the scene of the show, has 105,000 square feet of exhibition space, being the largest exposition building in New England. The truck display will be in the basement and will be by far the largest truck showing of the year. Every known truck equipment and accessory for the power hauler will be in evidence. There will also be electric trucks, trailers, semi-trailers and tractors on view.

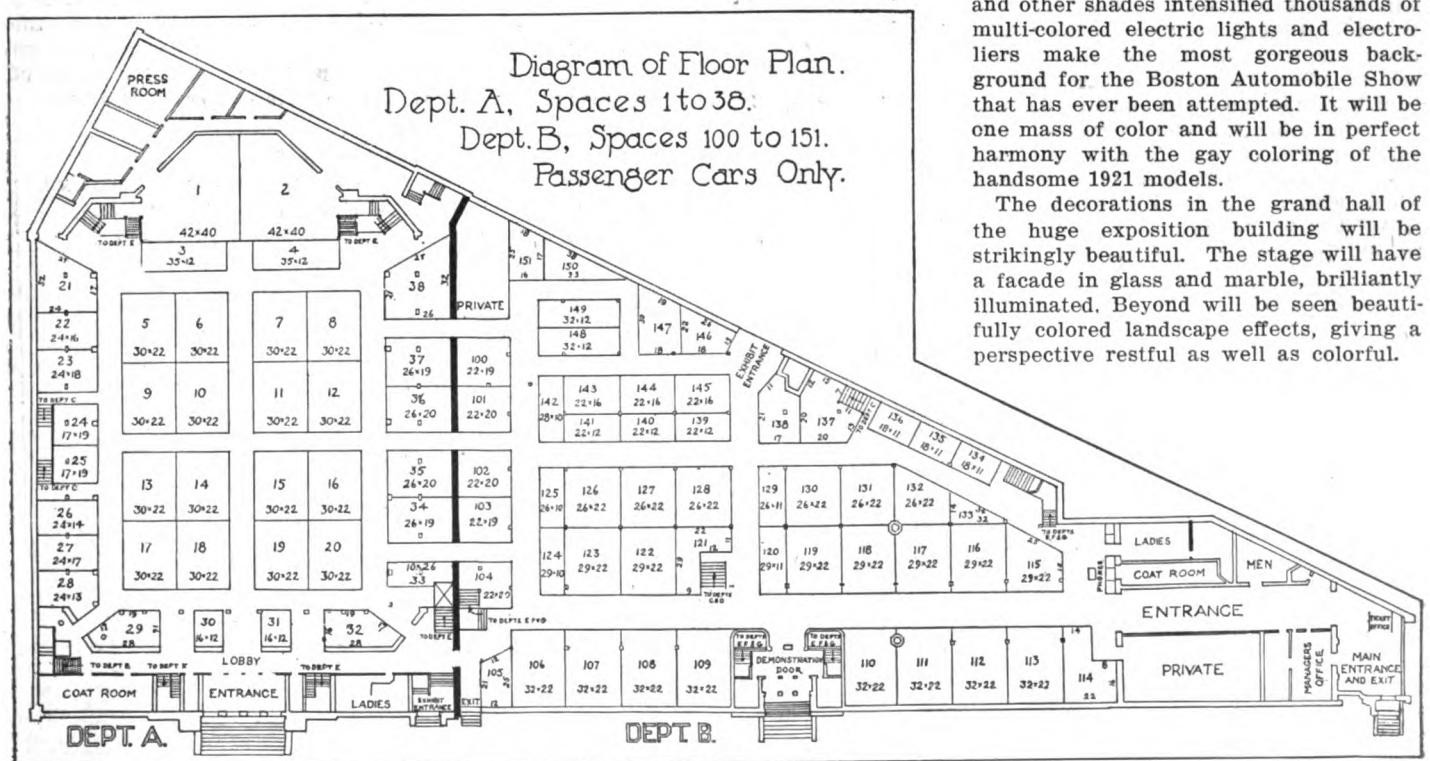
The accessory department will be a place of wonder for the man who owns a car. There will be hundreds and hundreds of devices that will appeal to the motorist. Some of these will even be a year in advance of the standard equipment to be noted on the new cars.

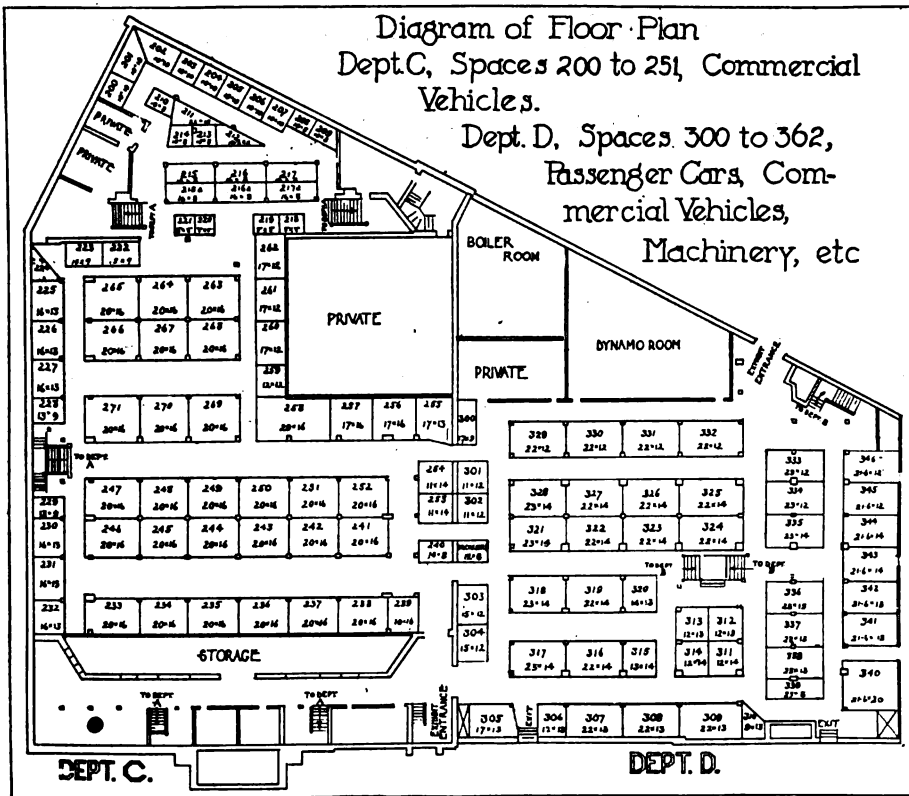
There will be a huge army of new things to be seen and the dealer can get more information as to the trend of affairs in an hour at the Boston show than he can at home in a month.

It will cost close on to \$100,000 to open the doors of Mechanic's building upon the automobile show. From far-off Japan and many European countries has come material to be used in the decorations.

The richest colors in royal purples, dull golds, green lacquers, deep wines and other shades intensified thousands of multi-colored electric lights and electroliers make the most gorgeous background for the Boston Automobile Show that has ever been attempted. It will be one mass of color and will be in perfect harmony with the gay coloring of the handsome 1921 models.

The decorations in the grand hall of the huge exposition building will be strikingly beautiful. The stage will have a facade in glass and marble, brilliantly illuminated. Beyond will be seen beautifully colored landscape effects, giving a perspective restful as well as colorful.





#### Show at Copley-Plaza.

In addition to the show at Mechanics' building there will be a special salon exhibit at the Copley-Plaza hotel. This is held also in connection with the regular show and under the auspices of the Boston Automobile Dealers' Association.

At the hotel there will be exhibited a line of closed cars sold by the Boston dealers mostly in the higher priced models. It will take up the entire ball-room and will be on a par with similar shows held at New York and Chicago.

Many of the foreign cars that have not been marketed since the world war will be on exhibition at the salon. The Mercedes, Fiat, Rolls-Royce and Sunbeam are some of the foreign cars exhibited. The limousines with their beautiful imported tapestries, silver and gold mountings, beveled glass windows, selling up to \$15,000, will be included in this exhibit. There will also be some medium priced closed cars in the salon, which will be the most extensive exhibit of this kind ever held in Boston.

#### Manager Campbell's Views.

In speaking of the outlook for this year Manager Campbell said:

"People will want cars in 1921, for efficient methods must prevail. But they will not ask as in years gone by: How about speed? How about comfort? How about prestige? The acid test will be: How much economy in transportation? How much gain to my business?"

"These are the questions which the automobile salesman at the show can answer with satisfaction to the sternest interrogator. In a year when efficiency in transportation will be essential, the passenger car and truck will have an opportunity to prove their worth to a degree not realized in the times of super-prosperity.

"We may or may not see the volume of orders which piled up in the first half of 1921. That period represented the demand of a market which had been starved for two years, plus the immediate requirements of the day. On the other hand each succeeding year brings greater need for hauling of goods and passengers from point, greater economies in time.

"We know that fundamental business conditions are sound. We know that the automobile is one of the primary transportation units. We know that the owner realizes to an increasing degree that the possession of a car is an extension of his power in business, as well as a widener of his social contacts."

The show is open day and evening.

#### Vehicles in New England.

At the present time there are registered in New England approximately 603,352 motor vehicles. They comprise 506,428 passenger cars and 96,924 commercial vehicles. That is not enough to reach a saturation point. Many will be scrapped this year.

Maine has 55,395 cars and 7512 commercial vehicles; New Hampshire, 30,240 and 4440, total 34,680; Vermont, not making a distinction, has 31,625 vehicles; Massachusetts, 253,245 cars and 51,386 trucks, total 304,631; Rhode Island, 40,800 of the former and 9575 of the latter, total 50,375; Connecticut, 95,123 and 24,011, total 119,134.

The New England total shows that more than 50 per cent. are owned in Massachusetts. That is natural, because this state leads the others industrially, and is second only to Maine in crops. Also its total population is some 50 per cent. of that of all New England.

#### Location of Exhibits.

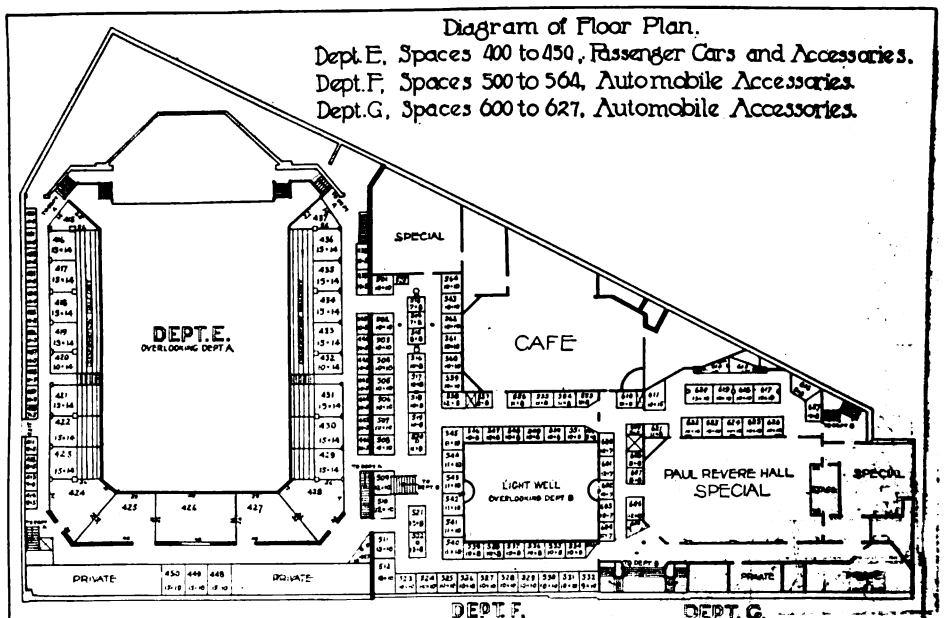
By referring to the list of exhibitors on the following pages and locating the space number on the plan views given herewith, any desired concern or product may be readily found. It will be noted that the concern making the exhibit, which is usually the Boston distributing concern, is listed, but that the various makes of cars and trucks are also listed alphabetically so that it is possible to locate any desired vehicle display by referring to the trade name of the car alone.

The factory addresses of many of the principal makers of accessories and equipment are also included.

#### PAIGE DETROIT BUSY.

The Paige-Detroit Motor Car Co., Detroit, intends to have all its men back and working on a 100 per cent. production schedule by the end of the month.

"Every automobile factory in the United States will again be operating on a 100 per cent. basis before the month of April is over," states President Jewett.



## Partial List of Exhibitors at Boston Automobile Show

Space	Name	Address	Space	Name	Address
505	Able Manufacturing Co.	San Francisco, Cal.	417	Detroit Pressed Steel Co.	Detroit, Mich.
33	Acker, Inc., Edward G.	Boston	413	Dickerson, C. A.	Chicago, Ill.
548-549	Acme Die Casting Corp.	Brooklyn	732-733	Dixie Flyer Car.	Boston
205-209 Inc. & 212	Acme Truck.	Boston	105-109	Dodge Brothers Car.	Boston
300	Ajax Motor Sales Co.	Boston	301-302	Dodge Brothers Truck.	Boston
300	Ajax Trucks.	Boston	111-112	Donovan Motor Car Co.	Boston
526	Alemite Lubricator Co. of N. E.	Bridgeport	30-31	Dorris Car.	Boston
424	American Car.	Boston	138	Dort Car.	Boston
506-507	American Chain Co., Inc.	Bridgeport	515	Double Seal Ring Co.	Chicago, Ill.
606	American Mutual Liability Insur. Co.	Boston	702	Duby, John F.	Mattapan, Mass.
405	American Storage Battery Co.	Boston	148-149	Dunbar-Sanders, Inc.	Boston
146	Anthony & Co., F. P.	Boston	201-202	Duplex Truck.	Boston
522	Apco Manufacturing Co.	Providence, R. I.	428	Dupont Car.	Boston
503	Apollo Magneto Corp.	Kingston, N. Y.	134-135-136	Dutton Motor Co., F. A. W.	Somerville, Mass.
605	Arrow Grip Mfg. Co.	Glens Falls, N. Y.	445-446	Dyer Co., The.	Cambridge, Mass.
412	Ashton-De Vere, Inc.	Boston			
340-341-342	Atlas Truck.	Boston	717	Eagle Oil & Supply Co.	Boston
134-135-136	Auburn Car.	W. Somerville, Mass.	333	Eastern Electric Vehicle Co.	S. Boston
323-324-325-326	Autocar Sales and Service Co.	Boston	726	Economy Timer Co.	Norwalk, Conn.
323-324-325-326	Autocar Truck.	Boston	628	Eggleston Supply Co.	Boston
605AA	Automatic Air Cushion Co., The.	Boston	147	Elcar Car.	Boston
700	Automatic Safety Signal Co.	Portland, Me.	546-547	Electric Storage Bat. Co., The.	Philadelphia
602	Automobile Legal Association.	Boston	125-126-127B	Essex Car.	Boston
620	Automobile Mutual Fire Ins. Co.	Boston			
621	Automobile Mutual Liability Ins. Co.	Boston	339	Facto Motor Truck.	Springfield, Mass.
517	Automotive Gear Works.	Atlanta, Ga.	339	Facto Truck.	Springfield, Mass.
			29	Falk-Baker Co.	Boston
228AA-229AA	Babcock Sales Co.	Boston	117-118-132-229-		
309-310	Baker Co., Inc., Day.	Boston	230-231	Fay-Allen Co., C. E.	Boston
336-337-338	Baker Motor Sales Co., Inc.	Boston	232-234 Inc.	Federal Trucks.	Cambridge, Mass.
			426A	Fiat Car.	Boston
14-18	Bassick Mfg. Co., The.	Chicago, Ill.	528	Flentje, Ernst.	Cambridge, Mass.
439	Beacon Motor Co., The.	Boston	447	Flexlume Sign Co.	Buffalo, N. Y.
22-23	Bearings Specialty Co.	Boston	231-732-733	Flynn Motor Sales Co.	Boston
303-304	Becker-Stutz Automobile Co.	Boston	100-101	Ford Car.	Cambridge, Mass.
30-31	Beeman Garden Tractors.	Boston	100-101-305	Ford Motor Co.	Cambridge, Mass.
524	Biddle Car.	Boston	305	Ford Truck.	Cambridge, Mass.
608	Bifex Products Co.	Waukegan, Ill.	406	Franklin, M.	Boston
704-705	Blanchard, H. H.	Boston	7-11	Franklin Car.	Boston
411	Boston Auto Top Co.	Boston	7-11	Franklin Motor Car Co.	Boston
140-144 Inc.	Boston Blacking Co.	East Cambridge			
139-145-307	Boston Bulck Co.	Boston	616-617	Gardner Car.	Boston
5-9	Boston Oldsmobile Co.	Boston	318-319-320	G. M. C. Truck.	Boston
24-25	Bowman Co., J. W.	Boston	545	Giant Grip Mfg. Co.	Oshkosh, Wis.
137	Brewster Car.	Boston	600	Gill Piston Ring Co.	Boston
243-250	Brisco Car.	Boston	426B	Grant Car.	Boston
531-532	Brisco Truck.	Boston	711	Greb Co., Inc., The.	Boston
220-221-220AA-	Brooks-Skinner Co., Inc.	Weymouth, Mass.	540	Greene & Swett Co.	Boston
221AA			725	Greist Mfg. Co., The.	New Haven, Conn.
140-144 Inc.	Buda Co., The.	Harvey, Ill.	343	Guaranty Motors Co.	Cambridge, Mass.
435	Buick Car.	Boston	434	Guaranty Truck.	Cambridge, Mass.
601	Bunting Brass and Bronze Co., The.	Toledo, O.	30-31	Gurtin-De Rochemont Co.	Boston
527	Burditt & Williams	Boston			
222-223-234	Burton-Rogers Co.	Boston	632	Hall Motor Co.	Boston
	Boston Federal Truck Co.	Cambridge	728-729	Hanson Car.	Boston
2			13-17	Hares Motors of N. E.	Boston
440	Cadillac Automobile Co. of Boston.	Boston	401	Harnett Lubricating Co.	Boston
2	Cadillac Car.	Boston	201-202	Harper-Libby Co., Inc.	Boston
3	Caldwell, Inc., Frederick J.	Boston	441	Harriman Co., The J. P.	Boston
614	Campbell Co., A. S.	East Boston	26-27-28	Hart Co., A. T.	Boston
544	Campbell Motors Corp.	Boston	508	Hartford Inc., Edward V.	New York
24-25	Canterbury, Inc., George W.	Boston	418	Hassler, Inc., Robert H.	Indianapolis, Ind.
719	Carleton Co., The.	Boston	38	Haynes Car.	Boston
414	Carroll Mfg. Co.	Arlington	26-27-28	H. C. S. Car.	Boston
611	Central Automobile Tire Co.	Boston	125-126-127B	Henley-Kimball Co.	Boston
117-118-132	Chalmers Car.	Boston	150	Hennigan, Inc., Walter B.	Boston
502	Champion Ignition Co.	Flint, Mich.	108-109-301-302	Henshaw Motor Co.	Boston
420	Champion Spark Plug Co.	Toledo, O.	121-122B	Hinchcliffe Motor Co.	Boston
122A-123-124	Chandler Car.	Boston	442-443	Hillman Auto Supply Mfg. Co.	Boston
122A-123-124	Chandler Motors of N. E.	Boston	340-341-342-728-		
115-116-308	Chevrolet Car.	Boston	729	Holland System, Inc., Trading Corp.	Boston
115-116-308	Chevrolet Motor Car of N. E.	Boston	618	Holmes Car.	Boston
215-216-217-215A-			615	Holmes Motors, Inc.	Boston
216A-217A	Clark Equipment Co.	Buchanan, Mich.	710	Houdaille Shock Absorber Co.	E. Cambridge
708	Carlisle-Ayer Co.	N. Boston	444	Howe & Co.	Boston
303-304	Cletrac Tractors.	Boston	125-126-127B	Hudson Car.	Boston
122A-123-124	Cleveland Car.	Boston	632	Hupmobile Car.	Boston
340-341-342	Clydesdale Truck.	Boston			
36-37	Cole Car.	Boston	235-236	International Harvester Co. of America	Somerville, Mass.
113	Columbia Car.	Allston, Mass.	235-236	International Truck.	Somerville, Mass.
542-543	Connell Co., W. J.	Boston			
129-130-131	Connell & McKone Co.	Boston	554-555	Jackson Electric Co.	Boston
709	Copithorn Mfg. Co.	Boston	427-603	Jackman-Jameson Motor Co.	Boston
500-501	Coward Auto Supply Co.	Boston		Jefferson Forge Products Co., The	Detroit, Mich.
415	Crew-Levick Co.	Cambridge, Mass.			
333	C-T Electric Truck.	S. Boston	344	Johnson, Arthur G.	Cambridge, Mass.
329	Cunningham Hearse and Ambulance.	Boston	121-122B	Jordan Car.	Boston
4	Cunningham Car.	Boston	303-304	"J. T." Tractor.	Boston
4-329	Cunningham Son & Co., James.	Boston	346AA	Johnson, Henry L.	Boston
703	Curtis Pneumatic Machinery Co.	St. Louis, Mo.			
5-9			437AA	"Kant-Rust" Products Corp.	New York
410	Daniels Car.	Boston	330-331-332	Kelly-Springfield Motor Truck Co.	Boston
630	Davis Chemical Mfg. Co.	Brockton, Mass.	330-331-332	Kelly-Springfield Truck.	Boston
631	Davis-Lyon Storage Battery Co.	Lynn, Mass.	425B	Kelsey Car.	Boston
409	Davis-Watson Mfg. Co.	Nashua, N. H.	425B	Kelsey Motor Co.	Boston
560	De-Lite Mfg. Co.	Dorchester, Mass.	504	Kelso Mfg. Co.	Trenton, N. J.
	Derf Mfg. Co., Inc., The.	New York			

Space	Name	Address	Space	Name	Address
147	King Car.....	Boston	263-268 Inc.	Pierce-Arrow Truck.....	Boston
147	King Motors, Inc.....	Boston	730-731	Premier Car.....	Boston
269-270-271	Kress & Son, O. F.....	Lawrence, Mass.	607	Pressure Proof Piston Ring Co.....	Boston
718	Kwix Co.....	N. Boston			
105-106-107	La Fayette Car.....	Boston	243-250	Rainier Truck.....	Boston
205-209 Inc. & 212	Lally & Sons Co., Eugene F.....	Boston	32	R & V Motors of N. E.....	Boston
407	La-Lo Chemical Co.....	Providence, R. I.	32	R & V Knight Car.....	Boston
408	Lambert Trublruf Tire Co.....	Boston	104	Rauch Lang Car.....	Boston
309-310	Lansden Truck.....	Boston	428	Reed Motor Car Co.....	Boston
707	Larco Wrench Mfg. Co.....	Chicago, Ill.	119-120	Reo Car.....	Boston
253-254	Lebon-Kidd Co., The.....	Boston	321-322-327-328	Reo Truck.....	Boston
616-617	Leghorn, G. M.....	Boston	253-254	Republic Truck.....	Boston
400	Lewis Tool Mfg. Co.....	Boston	626	Rimco Lubricator Co., Inc.....	Boston
34-35	Lexington Automobile Co.....	Boston	102-103	Roamer Car.....	Boston
34-35	Lexington Car.....	Boston	509	Robe Rail Sales Corp.....	New York
616-617	Liberty Car.....	Boston	105-106-107-315-316-317	Rockwell, Inc., C. P.....	Boston
321-322-327-328-119-120	Linscott Motor Co.....	Boston	104	Rommelfanger, N.....	Boston
13-17	Locomobile Car.....	Boston	113	Ross, Inc., R. R.....	Allston, Mass.
428	Lovejoy Mfg. Co.....	Boston	38	Russell Co., W. L.....	Boston
550-551-552	Luthy Storage Battery Co.....	New York			
15-19	MacAlman Co., J. H.....	Boston	229-230-231	Sanford Truck.....	Boston
306	MacBride & Co., Inc., George W.....	Boston	720-721-722	Sargent & Ham Co.....	Boston
256-257-258-259	Mack Motor Truck Co.....	Cambridge, Mass.	29	Saxon Car.....	Boston
256-257-258-259	Mack Truck.....	Cambridge, Mass.	420	Schrader's Son, Inc., A.....	Brooklyn
16-20 & 263 to 268 Inc.	Maguire Co., J. W.....	Boston	151	Scripps Booth Car.....	Boston
448-449	Malbohm Car.....	Boston	151	Scripps Booth Motor Car Co.....	Boston
539	Malay Rubber Co., The.....	Cleveland, O.	336-337-338	Selden Truck.....	Cambridge, Mass.
612	Malton Specialty Co.....	Boston	240	Sewell Cushion Wheel Co.....	Boston
448-449	Mann Motor Car Co.....	Boston	36-37	Smith & Sons Co., Bryant G.....	Boston
434	Marko, Paul M. & Co., Inc.....	Brooklyn	303-304	Sowers Tractor and Implement Co.....	Boston
8-12	Marmon Car.....	Boston	334-335	Springfield Commercial Body Co.....	Cambridge
426B	Martin Brackett Co.....	Boston	110	Standard Car.....	Boston
222-222AA-223	Martin-Parry Corp.....	Boston	431	Standard Oil Co. of N. Y. (N. E. Dept.)	Boston
712	Marvel Carburetor Sales Co. of N. E.	Boston	110	Standard Steel Motor Car Co.....	Boston
214	Masden Mfg. Co.....	Boston	525	Standard Thermometer Co.....	Boston
345-346	Maxim Motor Co.....	Middleboro, Mass.	21	Stanley Car.....	Newton, Mass.
345-346	Maxim Truck.....	Middleboro, Mass.	610	Stanley Co., Inc., John T.....	New York
117-118-132	Maxwell Car.....	Boston	21	Stanley Motor Carriage Co.....	Newton, Mass.
229-230	Maxwell Truck.....	Boston	15-19	Stearns-Knight Car.....	Boston
146	McFarlan Car.....	Boston	340AA	Steel Products Equipment Co.....	Boston
510	McQuay-Norris Mfg. Co.....	St. Louis, Mo.	150	Stephens Car.....	Boston
13-17	Mercer Car.....	Boston	237-238-239	Sterling Motor Truck Co. of N. E.	Boston
2AA	Middlesex Motor Car Co.....	Boston	237-238-239	Sterling Truck.....	Boston
706	Miles Piston Ring Co.....	Boston	24-25	Stevens-Duryea Car.....	Boston
512-523	Mills Cabinet Co.....	Racine, Wis.	311-314 Inc.	Stewart Automobile Corp.....	Boston
402-403	Minard Co.....	Framingham, Mass.	311-314 Inc.	Stewart Truck.....	Boston
114	Mitchell Car.....	Boston	111-112	Studebaker Car.....	Boston
114	Mitchell-Lucas Motor Co.....	Boston	22-23	Stutz Car.....	Boston
2AA	Monroe Car.....	Boston	513-514	Sunderman Corp.....	Newburgh, N. Y.
610A	Montello, V.....	Medford, Mass.			
615	Moon Car.....	Boston	3	Templar Car.....	Boston
416	Moreton Corp., Walter H.....	Boston	422	Texas Co., The.....	Boston
102-103	Morse Co., Alfred Cutler.....	Boston	556	Tide Water Oil Sales Corp.....	Boston
724	Morse, L. J.....	Springfield, Mass.	563-564	Tonneau Shield Co., Inc.....	New York
557	Mosler & Co., A. R.....	Mt. Vernon, N. Y.	226-227	Traffic Truck.....	Boston
538	Motor Accessories, Inc., John & Arthur	Boston	226-227	Traffic Truck Sales Corp.....	Boston
536	Motor Parts Co.....	Boston	518-519	Trexler Co.....	Philadelphia
516	Motor Vehicle Publishing Co.....	New York	615	Triangle Motors Co.....	Boston
269-270-271	Municipal Truck.....	Lawrence, Mass.	315-316-317	Troy Trailer.....	Boston
			426A	Turin Motors, Inc.....	Boston
105-106-107	Nash Car.....	Boston	344	Ultimate Truck.....	Cambridge, Mass.
315-316-317	Nash Truck.....	Boston	537	Underhay Oil Co.....	Boston
26-27-28	National Car.....	Boston	218-219	U. S. Air Compressor Co.....	Cleveland, O.
224-225	Netco Truck.....	Fitchburg, Mass.	627	U-Sav-Your Mfg. Co.....	Warren, Mass.
228	New Britain Mch. Co., The.....	New Britain, Conn.	128	Utterback-Gleason Co.....	Boston
228	New Britain Tractor.....	New Britain, Conn.	432-433	Vacuum Oil Co.....	New York
424	New England Amer. Motor Car Corp.	Boston	137	Velle Car.....	Boston
224-225	New England Truck Co.....	Fitchburg, Mass.	243-250	Velle Truck.....	Boston
137-243-250	New England Velle Co.....	Boston	423	Vulcan Motor Axle Corp.....	Detroit, Mich.
511	New Era Spring and Specialty Co., South Grand Rapids, Mich.				
437	New York Lubricating Oil Co.....	Boston	260-261-262	Walker Electric Truck.....	Boston
436	No-Leak-O Piston Ring Co.....	Baltimore, Md.	260-261-262	Walker Vehicle Co.....	Boston
33	Noma Car.....	Boston	624	Ward's Sons Co., Edgar T.....	Boston
318-319-320	Noyes-Bulck Co.....	Boston	425A	Waterman, George H.....	Boston
619	Nutter Electric Equipment Co.....	Boston	529-530	Weaver Mfg. Co.....	Springfield, Ill.
			730-731	Wells Motor Co.....	Boston
148-149	Oakland Car.....	Boston	427	Westcott Car.....	Boston
231	Old Hickory Truck.....	Boston	521	Westinghouse Air Spring Co., The.....	Boston
139-145-307	Oldsmobile Car.....	Boston	561-562	Westinghouse Union Bat. Co., Swissvale, Pa.	
309-310	Onelda Truck.....	Boston	429	White & Bagley Co., The.....	Worcester, Mass.
129-130-131	Overland Car.....	Boston	244-249 Inc.	The White Co.....	Boston
			244-249 Inc.	The White Truck.....	Boston
1-241-242 251-252	Packard Motor Car Co. of Boston.....	Boston	629	Whittredge Portable Steel Bldgs. Co.	Boston
1	Packard Car.....	Boston	723	Wight, Austin J.....	Boston
241-242-251-252	Packard Truck.....	Boston	558	Willard Storage Bat. Co., The.....	Cleveland, O.
127A-128	Palge Car.....	Boston	129-130-131	Willys-Knight Car.....	Boston
127A-128	Palge-Detroit Co. of N. E.....	Boston	534-535	Wilson Co., John V.....	Boston
609	Parker, Earl K.....	Boston	553	Wilson, K. R.....	Buffalo, N. Y.
14-18	Peerless Car.....	Boston	8-12	Wing Co., F. E.....	Boston
541	Perrine Co.....	Boston	625	Winsor & Son, Alfred.....	Boston
306	Phenix Truck.....	Boston	6-10	Winton Car.....	Boston
16-20	Pierce-Arrow Car.....	Boston	6-10	Winton Co., The.....	Boston
			421	Wire Wheel Corp. of America.....	Buffalo, N. Y.
			727	Wire Wheel Service, Inc.....	Boston
			404	Wright "Name-On" Robe Co.....	Waterville, Me.



# Features of New Cars at Spring Shows

## *New and Improved Body Designs and Many Refinements in Enclosed Models*

**V**ISITORS at the Boston Automobile Show, which opens its doors, Saturday, March 12, will have an opportunity to view at close range eight new cars which will be shown in Boston for the first time. Many minor changes will also be noticed in the cars with which the public are more familiar, though not of a radical nature, being more in the nature of refinement of the bodies or slight changes in the mechanical arrangement of the chassis units.

The new cars which will be shown in Boston for the first time include the new Wills-St. Claire, Dixie, Flyer, Dorris, DuPont, Gardner, Hanson, Kelsey and Handley-Knight.

New and improved body models in great number have resulted from the effort of the industry to make the cars of 1921 as salable as possible. Engineering changes are not of great consequence, for the chassis has for some time been acceptable from an engineering standpoint. The great element of salability comes in the bodies, and here the manufacturers have done a great deal to help the dealers during 1921.

The great number of new and changed body models clearly show the desire of the manufacturers to satisfy the public demand for comfort, convenience and a wide range of styles to cover varying tastes. For the most part the new body models are of the enclosed type. Some replace other enclosed models which have been found unsatisfactory, and in some cases the enclosed models are added to newer lines which, up to the present time, have not got beyond the open car stage.

### **Many Refinements in Enclosed Models.**

Many minor refinements will be noted in the enclosed models which tend for the comfort of the passengers and convenience in all weather driving and these features will prove effective sales points. Where new chassis have been added the idea seems to be to complete the line by the addition of a chassis with a different number of cylinders. A few years ago manufacturers decided on a four or six, and then tried to convince the prospect that the four or six was the only car worth buying. At present the idea seems to be to round out the lines and give the customer an option and let him suit his own taste in the matter of cylinders.

The great variety of color shown on the bodies is striking and, unlike former years, most of these colors can be had on stock jobs without extra cost.

Enclosed cars, in spite of the higher price, continue to command a great deal of interest from purchasers. This type of car being in great demand in New

England, the dealers and distributors have come to realize that they must show the latest and best along this line in order to get the interest of the purchasing public.

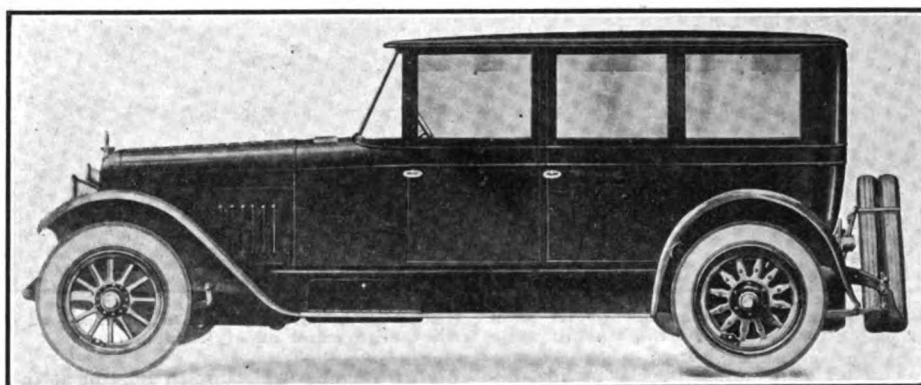
Eighty-seven different makes of passenger cars, exhibiting more than 350 distinct models, will be shown at the Boston show and fully two-thirds will be enclosed models, the other one-third consisting of open models and stripped chassis.

The winter top which had quite a run a few years ago and which was fostered by the manufacturers, has practically gone out of existence. Many of the open models are equipped with California type tops, which vary over a wide range from those that simply have the space back of the bow filled in to those fitted with the complete California top equipped with glass doors.

and overhead camshafts. The car is constructed of molybdenum steel, giving it a maximum degree of strength and sturdiness, combined with light weight. As a result unusually low gasoline consumption and reduced wear on tires should make the new car particularly economical in operation. Magnetically controlled headlights and a light to illuminate the rear of the machine when backing up are some of the many refinements incorporated in the Wills-St. Claire. The car weighs approximately 3000 pounds. The wheelbase is 121 inches and the tread standard, 56 inches. The price of the new car has been set at \$3500 f. o. b. Marysville, Mich.

### **Dixie Flyer.**

A new roadster, designated as the Speedster, is being shown in the Dixie Flyer line. This car is a two-seater,



**Mercer Sedan Model Designed for Both Touring and City Use—Note the Low Suspension and Long Wheelbase.**

Carbureting devices have not been changed to any great extent, what changes that have been made being more in the arrangement of the hot spot air intakes and some of these designs have been altered, but the fuel economy feature is not being given the prominence that was noted last year.

There is a very noticeable increase in the number of cars now regularly equipped with cord tires without extra cost and it is barely possible that more manufacturers, after seeing the trend on other cars at the show, will also come into line. Many cars are shown equipped with disc wheels, but for the most part these are not stock equipment and are furnished only at an extra cost.

### **Wills-St. Claire.**

The new Wills-St. Claire car, which will be shown in Boston for the first time, has been the subject of considerable interest throughout New England. The engine embodies a dozen basic patents by C. Harold Wills, and among other features it is equipped with overhead valves

which is given a racy appearance by lowering the seats and inclining the steering column at an acute angle. The price of this model is \$1895, which includes spot light, front bumpers, wire wheels and cord tires. Macbeth lenses, genuine leather upholstery and Gabriel snubbers, nicked radiator shells and windshield frames and bullet sidelights are some of the refinements in equipment.

### **Dorris.**

Improvements have been made in the lubrication system of the Dorris car for 1921, positive lubrication of the rocker arms and the tappets having been provided by a copper tube which fits the rocker arm shaft and supplies oil to the end of the push rod under the rocker arm and runs down the push rod through brass tubes to the tappets. Oil is supplied to the rocker arm shaft by pressure from the oil pump. All brass parts of the engine are nickel plated, as is also the throttle control. A Timken, fixed sub-type of rear axle and Thermoid universal joints are used.

**DuPont.**

Minor changes only have been made on the DuPont car. Thermo-syphon cooling has been abandoned and water circulation is now secured by means of a centrifugal pump. The foot room on the front seat has been increased two inches on all models.

**Gardner.**

The Gardner car is made only in a light four five-passenger and two-passenger roadster and is powered by a four-cylinder, L-head engine having a bore of  $3\frac{1}{2}$  inches and stroke of five inches. The car has been designed especially for the light car class and offers purchasers an unusually large five-passenger car having ample power and speed, which will prove economical of fuel and oil.

The car is equipped with one-man top, beveled glass rear window, hand fitted curtains opening with doors on right hand side, tools, tire outfit, Stewart-Warner speedometer, electric horn, extra tire rim, dash light, etc. Priced at \$1195 f. o. b. factory.

**Hanson Car.**

The Hanson six, 50-60, another new comer in Boston, is powered by a Continental Red Seal engine having a bore of

fitted which is ample for lighting and starting needs. Ignition is furnished by a Connecticut system which has proved ample for ignition purposes in the past.

The rear axle is a Timken fitted with tapered roller bearings and is of the semi-floating type. The Handley-Knight uses the one chassis for several types of bodies, including five-passenger touring, two-passenger roadster, five-passenger sedan, etc.

**R & V Knight Model R.**

The R & V Knight is powered by sleeve valve type engine, consisting of four cylinders cast en bloc, bore  $3\frac{3}{4}$  inches, stroke five inches, developing under N. A. C. C. rating, 22.5 horsepower.

The engine equipment includes Stromberg carburetor, Wagner ignition and Westinghouse starting and lighting, the chassis equipment a Borg & Beck clutch, Brown-Lipe transmission, in unit with engine and clutch, Salisbury rear axle floating type.

R & V Knight cars are made in several models, including open and closed types.

**Oldsmobile 43-A.**

A new model Oldsmobile is being

gear semi-floating rear axle.

The Model 43-A Oldsmobile is manufactured in four types of bodies mounted on the one chassis and includes a five-passenger touring car selling at \$1445; four-passenger roadster at \$1445; four-passenger coupe, \$2145, and five-passenger sedan, \$2145, f. o. b. factory, Lansing, Mich.

**Maibohm-B.**

The Maibohm car will be shown in several bodies, including open and closed models, and while this car is not new to New England, it offers several features which will prove interesting.

The car is powered by an engine of the company's own make, having a bore of  $3\frac{1}{2}$  inches and stroke of  $4\frac{1}{2}$  inches, developing under N. A. C. C. rating, 23.4 horsepower.

Engine equipment includes Tillotson carburetor, Atwater Kent ignition, Bijur starting and lighting generator and motor, and thermo-syphon cooling system.

The chassis equipment includes a Borg & Beck clutch, a gear set of the company's own make mounted in a unit with the engine and clutch and a full floating rear axle of its own make.

The new Maibohm has long, low body lines. The hood and radiator are high and give the car a "stunning" appearance. Real Spanish leather is used in the upholstery of the models, the cushions are placed low in the front compartment, allowing the occupants an opportunity to set low when driving, a feature which is much appreciated by motorists.

**Hupmobile R.**

Certain noteworthy improvements in finish, fittings and general appearance will mark the Hupmobile exhibit. This four-cylinder chassis of the present model now embodies numerous minor improvements in design and manufacture which have been developed since this chassis was first introduced in October, 1917. It has been thoroughly tested and approved in the hands of over 50,000 owners, and reached such a degree of mechanical perfection that Hupmobile engineers have felt free to concentrate more closely on appearance, body design and equipment details.

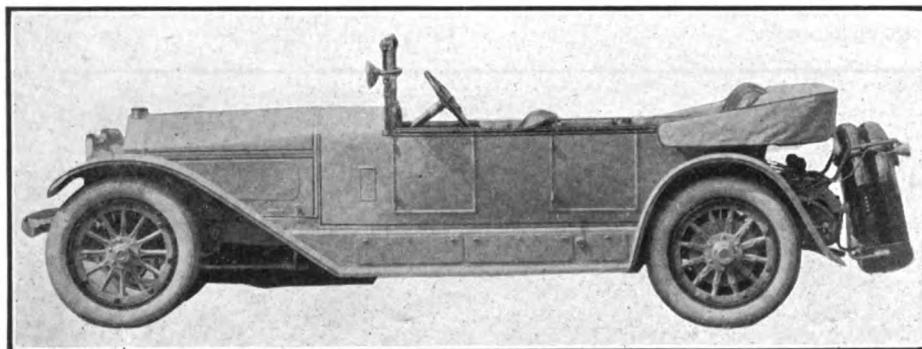
All four open and closed models will be shown in new body designs, one of the most noticeable being the two-door coupe.

The car is powered by a Hupmobile four-cylinder removable head engine cast en bloc, having a bore and stroke of  $3\frac{1}{4}$  by  $5\frac{1}{2}$  inches, with a piston displacement of 183 cubic inches, and developing under the N. A. C. C. rating 16.9 horsepower.

The engine is equipped with Stromberg carburetor, Atwater Kent ignition and Westinghouse starting and lighting units. Chassis equipment includes Hupmobile disc clutch and gear set in unit with engine, while the rear axle is of Hupmobile design three-quarter floating type.

**Grant Six H. X.**

The Grant Six cars seen at the show bear little if any resemblance to former models manufactured by this company. There is an entirely new radiator design,



**Locomobile Four-Passenger Sportif Model Designed Along Continental Lines—An Adaptation of the Racing Type with Comfort and Safety Added.**

$3\frac{1}{4}$  inches and stroke of  $4\frac{1}{2}$  inches, developing, under the N. A. C. C. rating, 25.3 horsepower, and is manufactured in four models: Four-passenger touring, two-passenger roadster, sport and sedan.

The touring model is priced at \$2365 and the sedan \$2885 f. o. b. factory.

**Kelsey.**

The Kelsey six-cylinder car is powered by a Falls engine, I-head type, having a bore of  $2\frac{3}{4}$  inches and stroke of  $4\frac{1}{4}$  inches, developing under S. A. E. rating 23.44 horsepower.

The distinguishing feature of the Kelsey is that the transmission is of the patented Kelsey friction type, no gears being used to transmit the power from the engine to the rear axles.

The touring car is priced at \$1800; runabout, \$1750, and sedan, \$2700 f. o. b. Newark, N. J.

**Handley-Knight.**

The Handley-Knight Model A is powered by a Knight engine of the company's own make which has a bore and stroke of  $4\frac{1}{4}$  by  $4\frac{1}{2}$  inches and develops, under N. A. C. C. rating, 27.2 horsepower.

A Tillotson carburetor is used with this engine to supply the gas, while an Autolite starting and lighting system is

shown for the first time in Boston at the show and while it does not differ greatly from other models of the Oldsmobile line, still the distinguishing feature of the car is that it is powered by a four-cylinder engine recently designed by the engineers of this company.

The engine is a regular I-head type, with the cylinders cast en bloc and having a bore of  $3\frac{11}{16}$  inches and stroke of  $5\frac{1}{4}$  inches, giving a piston displacement of 224 cubic inches. The S. A. E. rating of this engine is given as 21.7 horsepower, while the block test reveals that the engine is capable of developing 43.8 horsepower at 2000 revolutions a minute.

The engine construction and equipment is according to the latest engineering practise and while new structural features are incorporated they have only been used after severe factory and road tests.

The engine equipment includes the Oldsmobile Auto-Lite starting and lighting system, Remy ignition, Johnson carburetor and pump system of water circulation.

The chassis equipment presents a single-plate clutch of Oldsmobile manufacture, dry plate disc clutch and spiral

the wheelbase has been lengthened to 116 inches and the body lines are long, low and rakish.

The new Grant Walker engine has greater power and flexibility and all models are more roomy and comfortable. In addition to affording sufficient power for every requirement the Grant engine is compact and accessible. The crankshaft is balanced and of large dimensions, fitted with three large bearings and a force feed oiling system, insuring lubrication for every moving part. Its power and flexibility are very pronounced, the power unusual and the general construction insures economy of operation.

The Grant chassis indicates strength and durability. The pressed steel drop frame is extra deep and strong. The Columbia rear axle of the floating type is used with a one-piece housing of exclusive design fitted with 12-inch equalized brakes. The front axle is the I-beam type, drop forged.

The Stromberg carburetor is used with vacuum gasoline feed from the 16-gallon gasoline tank carried in the rear.

The starting and lighting system is furnished by a Bijur motor and generator and the ignition by an Atwater Kent distributor.

The clutch is a Borg & Beck disc type with the gear set a Durston, both of which are in unit with the engine.

#### Skelton Car.

The Skelton car is manufactured at present in a two-passenger roadster and five-passenger touring car, and although a new comer in the field, it is stated to be popular wherever shown. The car is unusually roomy for a five-passenger model and looks even larger than it is. This is due to the scientific design discernible in all Skelton cars. Because of the light weight construction and high class units employed, built purely from a service standpoint, its gasoline consumption is claimed to be very low, 25 miles a gallon having been shown in actual practice.

The tires used are one size front and rear, the smallest made. This is not because the car is small, but rather that this size tire has been found sufficient to carry the light weight of this roomy, powerful car.

The car is powered by a Lycoming  $3\frac{1}{2}$  by five-inch engine, L-head type and develops under N. A. C. C. rating 19.6 horsepower.

The engine is equipped with Carter carburetor, Connecticut ignition and Westinghouse starting and lighting system. The chassis is equipped with Borg & Beck clutch and Muncie transmission in unit with the engine, while the rear axle is a Peru full floating type. The wheelbase is 112 inches and the price \$1295 f. o. b. St. Louis.

#### Auburn Beauty Six, H. & K.

The Auburn Beauty 6-39 H. & K. will be shown in five models, a five-passenger touring car, sedan, roadster, coupe and tourster. These are each mounted on the same chassis and show a wealth of refinement which will be sure to appeal to the motorist. The enclosed cars are

provided with every refinement and appointment and affords open car comfort in summer and closed car warmth in winter.

The Auburn Beauty Six is powered by a six-cylinder Continental engine having a bore and stroke of  $3\frac{1}{4}$  by  $4\frac{1}{2}$  inches and developing under the N. A. C. C. rating 25.3 horsepower. The engine is equipped with Rayfield carburetor and Remy ignition, starting and lighting system. Cooling is by pump circulation through large size water jackets around the engine cylinders, valves, plugs, etc., in connection with a Jamestown radiator mounted crosswise of the engine frame in front of the engine.

The chassis equipment includes Borg & Beck clutch, plate type, and Grant-Lees gear set in unit with the engine. The rear axle is a full floating type Salisbury axle and the wheelbase is 120 inches.

#### New Ace Car.

The new Ace car, manufactured by the Apex Motor Corporation, Ypsilanti, Mich., equipped with the new Guy disc valve engine, is creating much interest among motorists as the engine in this car is equipped with a rotary type valve for which the manufacturer makes many claims. It is stated that this engine is the result of 10 years experimental work on the part of Fred M. Guy, vice president and chief engineer of the company. Eighteen months ago the first engine, a four, had been brought to a state of perfection which proved quite conclusively that this type of engine might mark a revolutionary advancement in valve construction. Since that time the entire engineering force has been concentrating on the development of a new six which at the present time is stated to be ready for production on a large scale.

The Ace engine valves are a series of discs, one in the combustion chamber of each cylinder. These discs are geared together in chain from a master gear driven from the crankshaft by worm. Each disc operates at one-eighth engine crankshaft speed and contains four slots cut in the form of a V from the periphery to the hub of the disc. These V shaped slots, in the process of the rotation of the disc, pass over ports which enter into the intake and exhaust manifolds of the engine. On the intake stroke of the engine four slots in the discs register with four ports in the cylinder, allowing the gas to enter the intake manifold. Several advantages are claimed for this method, chief among which is that scavenging of the cylinder is accomplished perfectly at any speed. Also, due to the perfect manner of handling the gases coming into and leaving the cylinders, a very high torque is obtained at low speeds which gives the engine unusual pulling power.

The Ace car is made in four models, touring, roadster, brougham and sedan.

#### Buicks for 1921.

The Buick line for 1921 comprises seven new models, each powered with the famous six-cylinder Buick valve-in-head engine. In other words, a single standard of mechanical excellence and

reliability is available for the purchasers of all Buick cars, supplemented by four closed and three open body types, which make it possible to apply the Buick standard to individual requirements.

The roadster, model 21-44, is distinctly a new model, coming as the result of the growing demand for a more roomy and luxurious car of limited passenger capacity. Not only have the radiator and hood lines been improved, but the rear of the body has been widened which, with the new crown fenders and skirts, gives the entire car a very attractive appearance.

The model 21-45 is designed to meet the many demands for a five-passenger car and adapts itself to the needs of the business man and his family or to the comforts of the tourist who enjoys long trips.

As with the roadster, this car is equipped with a specially designed top, which eliminates all bows and obstructions to the vision. The new patented gypsy curtain gives greater protection to the passengers in the tonneau.

Head lamps have been designed to harmonize with the new body lines. The skirts and inner portion of the front fenders also conform with the improved design. The opening between the gas tank and the rear fenders has been closed to prevent the possibility of the rear wheels splashing the corners of the body.

The Model 21-46 four-passenger coupe is designed especially for the doctor or business man who is obliged to travel in all weathers and offers the motorist the latest ideas commensurate with comfort and convenience.

Sufficient storage space is carried in the rear of the operator's seat and in the rear for the storage of necessary bulky articles such as suit cases, etc.

Model 21-47 makes a wide appeal among motorists because of its wide range of usefulness. It has the roominess to accommodate the small family comfortably, and still is light enough to adapt itself to individual needs of the busy man or woman.

Model 21-48 is an addition to the Buick line and corresponds to the large seven-passenger sedan much in the manner that the four-passenger model 46 corresponds to the five-passenger sedan. This model is strictly a full four-passenger coupe, which is amply provided with all comforts and conveniences found in the other models and is also supplied with sufficient storage space.

Model 21-49 is a big, roomy, seven-passenger car, complete in all the details that make for comfort and convenience in city or country driving.

Features of this car are wider door openings and more room in the tonneau for extra passengers, which have been secured by a change in design. The folding seats are so arranged as to give liberal space to the extra passengers and, when not in use, may be folded back into the seats out of the way.

Model 21-50 is a car for the family that seeks luxury, added room and delicate refinements in a year-round vehicle. The altered lines of the exterior have, in ad-

dition to improving the beauty of the car, made possible greater room and more generous seats for extra passengers. The folding seats disappear completely, leaving a very roomy rear compartment. Ventilation is controlled by adjustable windows and windshield. Convenient silk shades are fitted at the windows and the anti-glare sun shade makes for the comfort of the driver.

#### Chandler Six.

The Chandler Six is manufactured in six models: Four-passenger roadster, seven-passenger touring, limousine, four-passenger coupe, seven-passenger sedan and four-passenger dispatch. A single six-cylinder chassis is used for each of these models, which is powered by a Chandler six-cylinder engine having a bore and stroke of  $3\frac{1}{2}$  by five inches, developing under N. A. C. C. rating, 29.4 horsepower. The engine is equipped with Rayfield carburetor, Bosch high-tension ignition and Gray & Davis lighting and starting system.

The chassis is equipped with Borg & Beck clutch, plate type, and Chandler gear set in a unit with the engine, while the rear axle is a Chandler full-floating type.

The wheelbase is 123 inches and the wheels are wood artillery type standard, equipped with 33 by four-inch tires.

#### Dort Four, Model 15.

The Dort Model 15 for 1921 is manufactured in four models: Five-passenger touring, two-passenger roadster, sedan and coupe. One chassis is used for all bodies and includes in its construction many improvements over previous models. A Lycoming engine supplies the power, which has a bore and stroke of  $3\frac{1}{2}$  by five inches and develops under N. A. C. C. rating 19.6 horsepower. The engine is fitted with Stewart carburetor and Northeast ignition, starting and lighting system. The Dort clutch in combination with a Dort transmission, which is in a unit with the engine, transmits the power of the engine through the propeller shaft to the bevel gears in the Flint rear axle of the three-quarter floating type.

#### Franklin Series 9-B.

The Franklin car is manufactured for the 1921 season in six models: Touring car, runabout, four-passenger roadster, sedan, brougham and two passenger enclosed.

Two features which have been added to the new models is that the engine is now equipped with a new type long piston. Cars with engine fitted with these pistons have been severely tested by the factory engineers during the past year and the results have proved so satisfactory that the company decided to incorporate them in the new season's models.

Another feature which has been added to the engine components is the new electric vaporizer, which is located on the carburetor, above the gasoline level, so that the hot coil effects only the mixture of gasoline and air. It is stated that the use of this device increases the efficiency of the engine during cold weather and that practically all raw gasoline is prevented from passing into the

cylinders during the starting of the cold engine and also that it is practically impossible to flood the engine with raw gasoline when starting.

The shape of the hood is the principal change in the body lines; the sloping hood has been discontinued and a newly designed hood fitted in its place, giving a more pleasing appearance to the lines of the car.

#### Mercer.

The Mercer is manufactured in six models for the 1921 season: Two-passenger raceabout, two-passenger runabout, six-passenger touring, four-passenger sporting, four-passenger coupe and six-passenger touring limousine.

The Mercer car is powered by a Mercer engine having a bore and stroke  $3\frac{3}{4}$  by  $6\frac{3}{4}$  inches, developing under N. A. C. C. rating 22.5 horsepower. The engine is equipped with Ball & Ball carburetor, a Berling high-tension magneto supplies the ignition current, while the starting and lighting motor and generator are of Westinghouse manufacture. The chassis is equipped with clutch and gear set of Mercer manufacture, disc type, and the rear axle is of Mercer make, full floating type. The wheelbase is 132 inches and wood wheels are standard equipment fitted with 32 by  $4\frac{1}{2}$ -inch tires.

Many innovations will be found in the enclosed models of the Mercer line for 1921, among which may be mentioned the low center of gravity and the body lines, which are unusually low for this type of car. Due to the low suspension no head room is sacrificed.

The seating arrangement follows the popular type and embodies the latest ideas in seating arrangement. The coupe is designed as a popular all-around car for the man who drives alone most of the time, while the sedan is more of a family car and the seating arrangement and the upholstery has been designed with that idea in mind.

The six-passenger touring and runabout models have been designed in the body with curved lines on a low chassis, and gives an appearance of long sweeping curves. The seats are low and deep, the backs conforming with the natural position of the body. Every provision has been made for the driver's and passenger's comfort. One of the features of the Mercer is the unique accessibility of the mechanical design.

#### Locomobile 48, Series VII.

The Locomobile 48, Series VII, comprises four models: A four-passenger touring, seven-passenger touring, seven-passenger limousine and a seven-passenger landaulet.

The closed cars of this series embody every known luxury and convenience and retains that harmony of colors so much desired by users of high grade cars.

The Locomobile cabriolet is designed with the idea of preserving the car's smart appearance when open as well as closed. The rear leather covered tonneau is rounded to conform to the prevailing style, though the curves are not too pronounced. The richness of this model is brought out by an unusual color scheme of light purple lake, triple

striped, with black and gold.

The four-passenger touring car is fitted with a double cowl which was developed in order to give the passengers in the rear seat the maximum protection and at the same time retain all of the advantages of touring in the open air. The body is very closely coupled and the cowl, with its auxiliary windshield, extends to the rear seats, fitting snugly about the passengers. One advantage of the double cowl type is that it permits the use of the very popular Victoria hood. The color scheme is blue with nickel radiator and fittings. Blue leather upholstery matches the finish and two fine lines of gold striping emphasize the unusual lines.

The Locomobile sedan is a new development in body design. While extremely roomy and comfortably accommodating six passengers, its rounded and narrow lines give it the impression of being very small. One feature of this sedan is the cowl, which is modeled after that of the Locomobile Sportif. There are no pronounced angles in this model, a radical departure from the square cornered type. A special feature is the new type windshield. The tilted glass offers complete protection, but does not interfere with the vision of the driver. The glass partition between the driver and passenger compartments may be completely dropped out of sight if desired. The entire car is painted Simplex green with a triple stripe of black and cream. The front compartment is upholstered in leather, the rear in gray cloth, with enameled fitting to match.

The Locomobile Sportif is a strictly Continental model, being an adaptation of the racing type with comfort and safety added. It is low and racy in design and light in construction, close coupled and with a platform at the rear for luggage. This is a model preferred by the younger set, but may be used with equal delight by their elders.

The wheels and springs are of light red with a double stripe of darker red matching the body. It is fitted with a special top with polished mahogany bows and is covered with a special shade of imported English Burbank.

The Locomobile coupe limousine represents the modern type of town car, combining the stately lines of the limousine with the smarter ones of the coupe. Straight lines predominate, but are not exaggerated. The interior is finished in a new shade of dark tan broadcloth, giving it a severely tailored appearance.

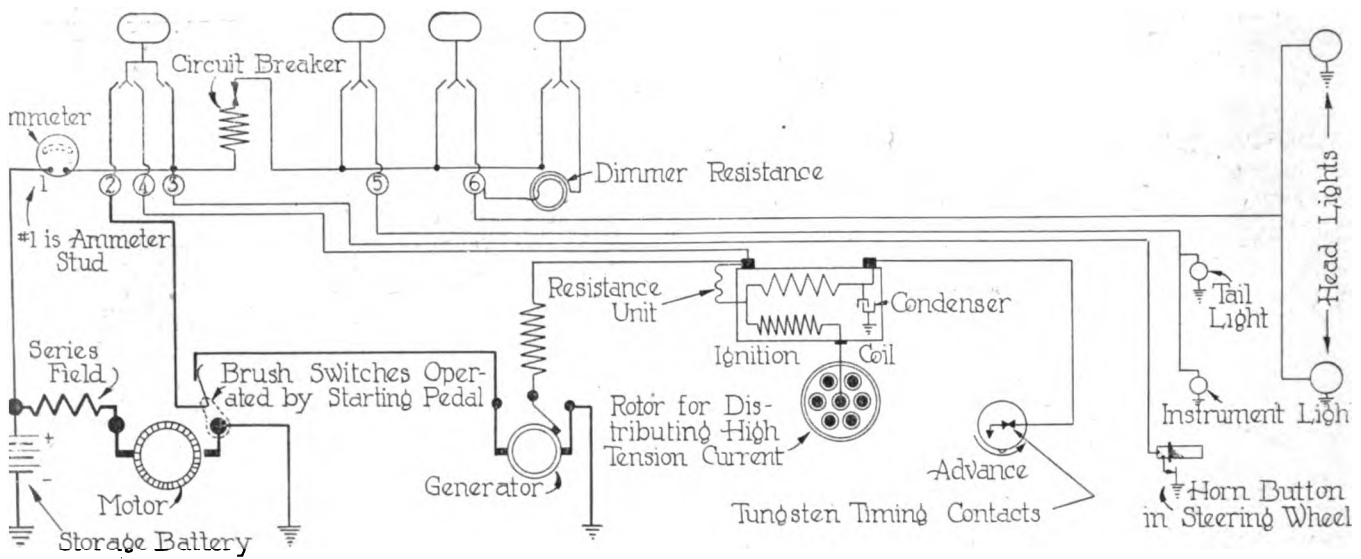
The Locomobile standard limousine is a striking example of how far one may express individuality in a strictly formal car. The color scheme is a medium cobalt blue with black fenders and splashers. A triple stripe in black and gold accentuates the long sweeping lines. The interior is exceptionally roomy and the special metal fittings by Tiffany harmonize with the paint work and upholstery.

At the supplementary show, which will be held in the Copley Plaza hotel, will be displayed the Fiat, Mercedes, Rolls Royce, Sunbeam and limousines in the \$15,000 class.

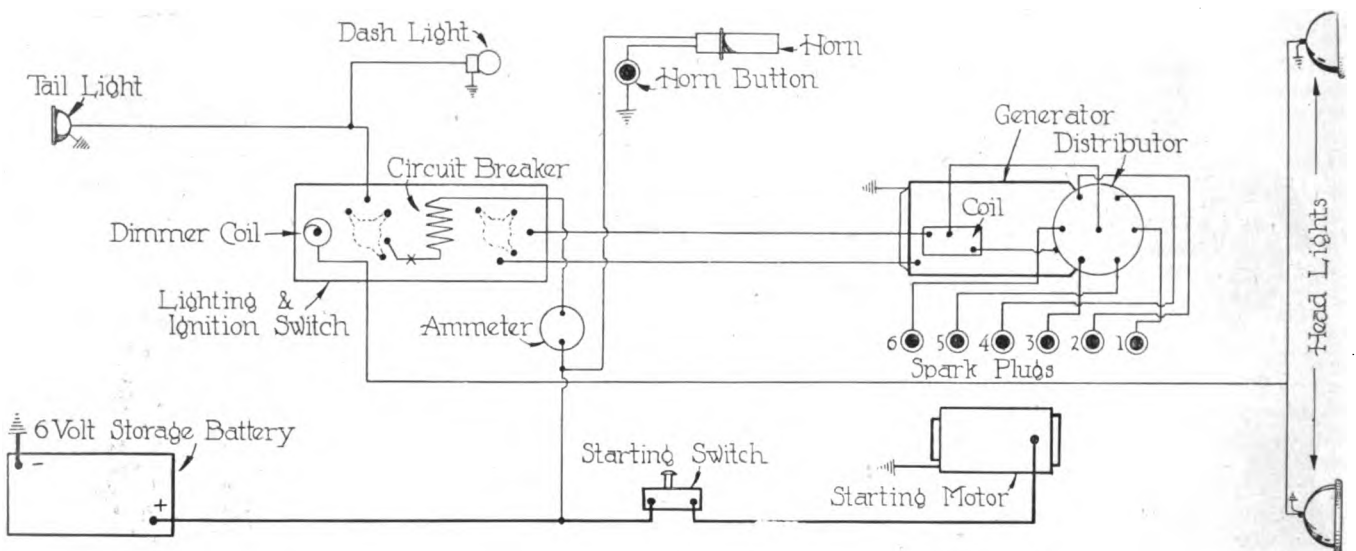




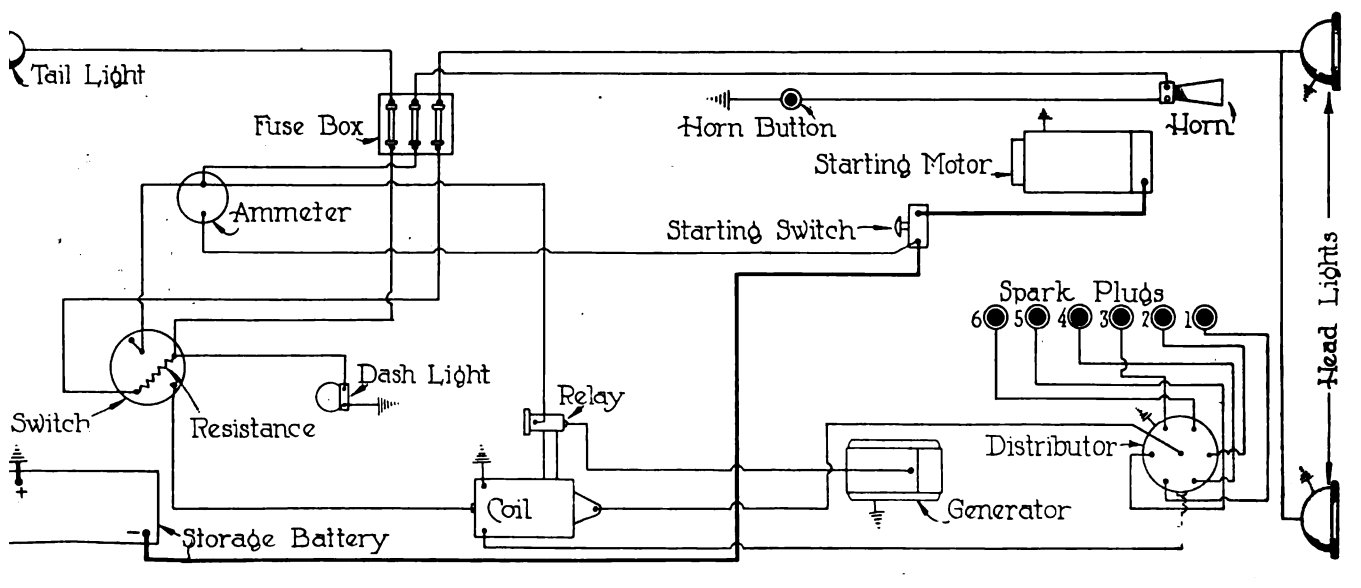
# Monthly Wiring Diagram, No. 13



Moon 1916 Model 6-30 and 6-44 Delco System, Single Unit.



Moon 1917-1918 Model 6-43 Delco System, Single Unit.



Moon 1919 Victory Model, Wagner Two-Unit System.

# NOTES OF INDUSTRY AND TRADE

## Ford Outlines Plans for Expansion

In what is claimed to be the first authoritative statement in regard to his plans for the expansion, present and future, of the mammoth Ford enterprises, Henry Ford gave out the following information based on conditions the last week in February:

That plans for the new power project and factory at Green Island, near Troy, N. Y., are being moulded into shape following the recent permit of the United States government to go ahead with the work.

That the Ford factories are turning out at present about 3000 automobiles and 200 tractors each day, which is pretty nearly the pre-war schedule, even with the smaller number of men employed. He expects the demand to increase just as regularly as it did before 1917.

Estimates from a reliable source place the number of men at work in the Highland Park Ford plant at about 24,000 and at the Rouge plant about 6000.

That there were 95,000 cars in the hands of dealers and 30,000 in process of construction at the branches when the Highland Park plant closed Dec. 24.

That 57,000 cars were sold during January, liquidating the 30,000 completed in the branches and 27,000 of the dealer stocks.

That retail sales for the first half of February were 42,000.

That total production for February was 35,000.

That sales through February approximated 85,000, assuring the liquidation of 50,000 more of the dealer stock.

That dealer requirements for March are 70,000, necessitating a production schedule of 3100 daily, within 1100 of the record for daily production.

That working forces and production will be increased steadily until normal production is reached.

That continued operation and increasing production is contingent on steel prices and that if the company is forced to again shut down it will be due solely to prohibitive steel prices.

That there will be no reduction in the wages on specific jobs and no reduction in the minimum scale.

That the Ford Motor Co.'s reply to reports of financial stress is the announcement of steadily increasing working forces and output scheduled to reach close to normal by the end of March.

That the executives now in charge at Highland Park and River Rouge will constitute the permanent official personnel with official titles in most cases eliminated and concerted efforts being directed to development of Ford products and policies.



New Factory of Neville Steering Wheel and Manufacturing Co. at Wayne, Mich.

## AUTO ELECTRICIAN'S GUIDE, NEW EDITION.

The Michigan State Auto School, Detroit, has issued a new volume of the Auto Electrician's Guide, a compilation of automotive wiring diagrams. The guide is complete in two volumes, the two together containing over 1700 different wiring diagrams, ranging from 1906 to 1921 models. This is said to be a much larger number than any similar book issued to date has approached.

The price of the Auto Electrician's Guide is \$15. It can be secured from the Michigan State Auto School, 3729 Woodward avenue, Detroit, Mich.

## DECREE IN CONNECTICUT PATENT SUIT.

It is announced that a final decree has been announced in favor of the Connecticut Telephone & Electric Co., Meriden, Conn., in the matter of patent infringements, which is of special interest from the fact that it is stated to be the first action brought against a jobbing concern

to prevent the distribution of ignition repair parts made in imitation of Connecticut parts. It is stated that several permanent injunctions had previously been granted the plaintiff against manufacturers who produced parts that infringed the Connecticut patents, and that two others have since been issued.

The intention of the Connecticut company to protect its interests and those of automobile manufacturers and owners using Connecticut ignition is clearly evident in the policy it has recently adopted and which it is aggressively following, of seeking court relief from the production and distribution of pirate parts, which it insists are harmful to the interests of all.

## NEVILLE MANUFACTURING CO. IN NEW QUARTERS.

The accompanying illustration shows the new quarters of the Neville Steering Wheel & Manufacturing Co. at Wayne, Mich. This concern makes the Neville More Room Steering Wheel and this new location will provide much needed space for the expansion of the company's production activities, giving more than three times the floor space as was had at the old plant in Detroit.

The new factory is of brick and cement construction, 50 by 280 feet, with plenty of light and modern facilities.

## WORLD'S FIVE-MILE RECORD BROKEN.

Great interest was aroused in racing circles by the recent performance at Daytona Beach, Fla., of a Ford car equipped with a type BB cylinder head, undersliding parts and other special equipment supplied by the Laurel Motors Corporation, Anderson, Ind., in breaking the world's amateur five-mile record.

The distance was made in three minutes and 46 seconds, or at the rate of 80 miles an hour, and the record is all the more remarkable when it is considered that there are two turns in the five-mile course.

The car is owned by the San Juan Garage Co. of Daytona, Fla., and was driven by "Cassey" Wingate.



Henry Ford, Founder of Ford Motor Co.

## Death of Head of R & V Motors Co.

There was deep sorrow throughout the industry at news of the death of W. H. Van Dervoort, head of the R & V Motors Co., long a leader in the automotive field, who died at his home, Moline, Ill., on Feb. 25. He had been ill for more than a year. He was stricken Feb. 13, 1920, and for nine months past had been confined to his bed. He was in his 52nd year.

The death of Mr. Van Dervoort closes a notable career. His life had been devoted to the business which bears his name, and the success that he had achieved, both for himself and the R & V industries was the result of unceasing labor, coupled with exceptional engineering skill and a marked capacity for organization.

At Michigan Agricultural college Mr. Van Dervoort and O. J. Root had been roommates and classmates, and in 1899 they formed a partnership for the manufacture of gasoline engines and locomotive specialties. They then established in a small way the enterprise destined to become one of the most important in the industry.

### Wrote Scientific Treatise.

He was widely recognized as an authority on mechanical engineering, and was the author of a text book on "Machine Shop Tools and Shop Practise." He was the author of a number of articles in scientific and technical publications. Because of his technical knowledge and his intimate acquaintance with industrial questions, he was in great demand as a speaker before scientific and business organizations. He acquired a wide reputation as a public speaker.

Many signal honors were conferred upon him. He served two years successively as president of the National Metal Trades association. He was at one time president of the Society of Automobile Engineers. For three years, from 1908 to 1911, Mr. Van Dervoort was a member of the committee on management of the American Motor Car association, which later became the National Automobile



W. H. Van Dervoort, Head of R & V Motors Co.

Chamber of Commerce. In the latter organization he had held many important positions.

Mr. Van Dervoort gave practically all his time to the government during the war. He served successively as member of the munitions standards board, the national war labor conference board and the United States War Labor board. After the war he was chosen as one of a commission of five sent by the National Industrial Conference board to Europe to study industrial conditions.

He was particularly active in making arrangements for the R. & V. plants to operate on high speed in his country's cause, these factories proving one of the most important sources for eight-inch gas shelves for the war department and four-inch navy rifles for the navy department.

The special effort and energy he expended in the service of the government, together with the trials of his European trip, is generally attributed as the cause which led to his decline in health. A figure of worth to the country and to the industry in which he was such a vital part, has been lost in his passing.

## Dodge Brothers Building Big Addition

Substantial evidence of the confidence in the future of the business of Dodge Brothers, the well known Detroit manufacturer of Dodge Brothers cars, is found in its expenditure of between \$6,000,000 and \$8,000,000 in the expansion of its factory. The present building programme is the largest in the history of the concern, and will bring the total floor space of the plant up to more than 100 acres. In 1914, when the production of Dodge Brothers motor cars began, the total floor space was eight acres.

The principal unit of the construction programme now in progress is the new press steel building, with a floor area of 860,000 square feet. The new construction building, which has just been completed, is eight stories high and has a floor area of 140,366 square feet. Another important unit now being built is the power plant.

With the gradual expansion of the factory the interplant traffic problem became one of prime importance. The distance between the main building and plant four is nearly a mile and until recently it was necessary to cross 12 railroad tracks to reach it. This problem was solved by the simple, but costly expedient of digging a tunnel. Now half the distance is cut off and traffic passes under the 12 tracks instead of over them. The tunnel is a good example of the efficiency measures always being introduced at the Dodge Brothers factory, which has the reputation among authorities of being one of the most thoroughly equipped and best managed factories in the world.

When the present building operations are completed others will probably begin. There is nearly always something in progress. The maximum production attained so far was an average of about 600 cars a day, but this will be materially increased by the extra facilities.

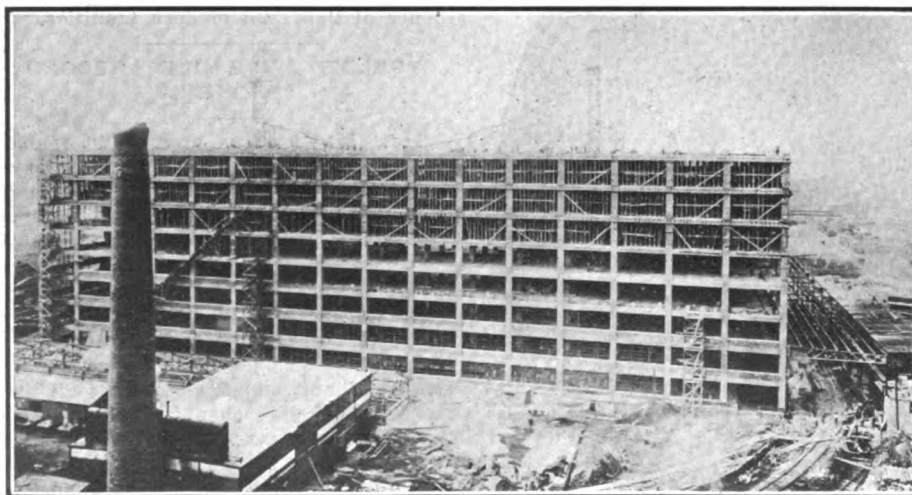
### KIRKLAND-CRAVENS MOTORS IS HAYNES DISTRIBUTOR.

The Haynes Automobile Co., Kokomo, Ind., has made official announcement that the Kirkland-Cravens Motors, Inc., 1513 McGee trafficway, is to have the distribution of Haynes cars in all of the states of Kansas, Oklahoma and western Missouri and northwest Texas.

The officers of the new company are as follows: President, H. G. Kirkland; vice president and treasurer, Walter Cravens of Salina, Kan.; general manager, H. E. Rose; vice president, F. D. Phillips; manager of wholesale department, Ralph C. Garland; retail sales manager, George R. Hutchings.

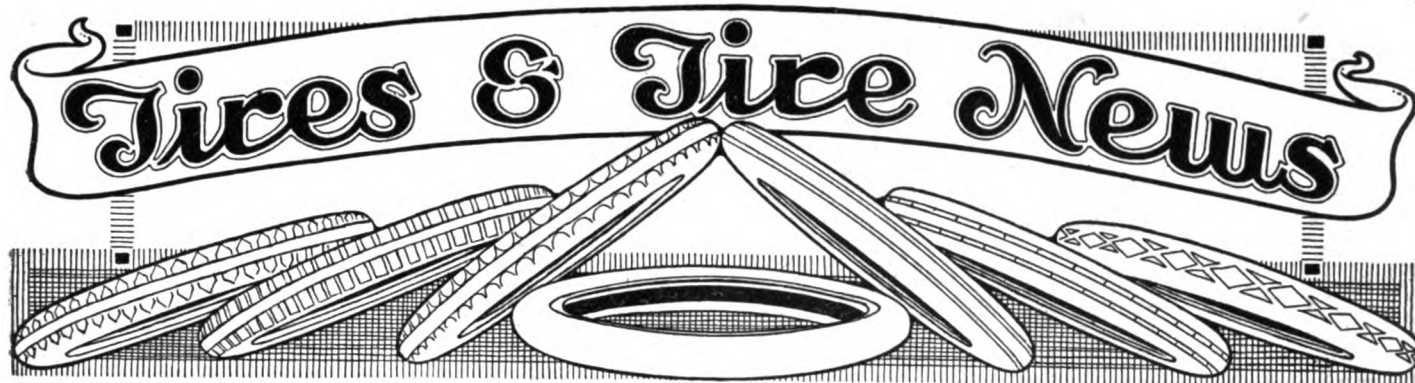
### WORKING ON FULL TIME.

The foundry and machine shop of the Pennsylvania Piston Ring Co., Cleveland, O., started full operations on March 1 and is now working on the regular full-day basis.



Indicating Extensive Expansion Programme of Dodge Brothers Co. at Detroit.





## Financial Notes of the Tire Industry

The preliminary report of the United States Rubber Co. for the past year shows a striking gain in earnings compared with 1919. The net profit, after all charges and allowances for federal, British and Canadian taxes, was \$21,275,524, or the equivalent, after preferred dividends, of \$19.82 a share on the \$81,000,000 common stock. In the previous year the net profit was \$17,730,237, equivalent after preferred dividends to \$17.59 a share on the \$72,000,000 common stock then outstanding.

Total sales last year were \$255,744,635, the largest in the history of the company. In 1919 the sales amounted to \$225,589,465, and in 1918 to \$215,398,425. The balance sheet shows current assets of \$195,505,243 and current liabilities of \$153,452,426. The report states that inventories were written down \$11,020,605, but actual supplies on hand were much larger at the close of 1920 than at the end of 1919. The current report places inventories at \$122,873,231, whereas inventory in the previous report was put at \$87,633,699.

### B. F. GOODRICH EARNINGS.

The net sales for the year of the B. F. Goodrich Rubber Co., Akron, O., are reported to amount to approximately \$150,000,000.

At the recent meeting of the directors a dividend of 3½ per cent. was declared on the preferred stock, 1½ per cent. payable on April 1, 1921, to stock of record March 22, and 1½ per cent. payable July 1 to stock of record June 21. The directors voted, subject to the approval of the stockholders at the annual meeting in April, to retire 11,880 shares of preferred prior to July 1, 1921, in accordance with requirements of the charter, to set up out of surplus a reserve of \$10,000,000 to provide for all possible contingent losses on raw material commitments for future delivery, and to take action with regard to the May dividend on the common stock at meeting of directors to be held in April.

### FIRESTONE CO.'S INVENTORIES.

The Firestone Tire and Rubber Co., Akron, O., whose Jan. 1 inventories stood

at \$37,273,873, against \$26,969,535 on Jan. 1, 1920, had materials on hand, in transit and in process valued at \$21,168,140, against \$11,217,872, finished goods valued at \$16,105,733, against \$15,751,662.

### GUNN ELECTED PRESIDENT HIGHWAY ASSOCIATION.

At the recent annual meeting of the directors of the Lincoln Highway Association, James Newton Gunn, president of the United States Tire Co., vice president of the United States Rubber Co. and a director of the Lincoln Highway Association, was unanimously chosen as president to succeed F. A. Selberling, who was unable to accept the office for another year on account of the pressure of his business and personal affairs. Mr. Gunn has been in close touch with the aims and purposes of the association and the work accomplished, and is deeply interested in its further progress, as indicated by his action, together with that of his business associate, C. B. Sieger, president of the United States Rubber Co., in making possible the financing of the Ideal section of the Lincoln highway. In accepting his new office Mr. Gunn said: "I know that the work of the association should be very much more ef-

fective and important now than ever before, and with the opportunities we have under the new conditions in political and industrial life we should be able to accomplish a great good in stimulating the interest and constructive work in highway development throughout the entire country."

Mr. Selberling continues as a vice president and member of the executive committee of the highway association and W. A. Rutherford of the B. F. Goodrich Rubber Co. becomes a director.

### SUGGESTIONS TO TIRE MANUFACTURERS.

The well known advertising concern, the Proctor & Collier Co., 528 Walnut street, Cincinnati, O., has issued in pamphlet form, for more general distribution, a reprint from a recent suggestive article in its house organ, "The Day's Work," entitled "What Must a Tire Manufacturer Do to Survive?" The publisher does not claim that this discussion offers a brief for distributor or dealer, as it hits only a few of the high spots, and it is not intended in any way as a criticism of the manufacturer, but is simply offered as an effort to place before manufacturers an analysis of tire selling situation as dealer and distributor see it.

The Proctor & Collier Co. will be glad to send copies of the pamphlet to all who are interested in the tire business, and expresses itself as desirous of discussing with any representative tire company the particular plan and method of operation it would suggest as needed to meet the present unusual situation.

### REORGANIZATION OF FORT WAYNE COMPANY.

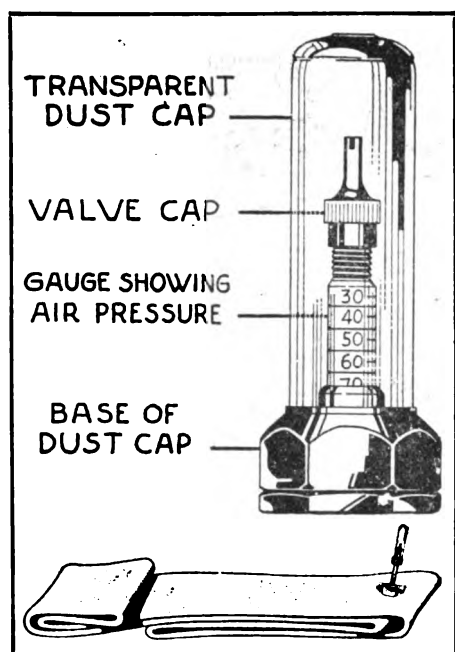
The Fort Wayne Tire & Rubber Co., Fort Wayne, Ind., has reorganized with L. R. Welker as its new president and C. M. Billings, secretary and treasurer.

The new board of directors includes Albert E. Thomas, P. F. Hunt, Bluffton; Dr. G. L. Shumaker, North Manchester; August Chenoweth, Warsaw; J. P. Gerhardt, Garrett; Albert Feigert, Wren, O.; E. D. Engler, Decatur.

Service membership in the American Acceptance Council, New York city, has been taken by the Mansfield Tire & Rubber Co., Mansfield, O.; Charles Hoffman, treasurer.



James Newton Gunn, a Prominent Executive of the United States Rubber and United States Tire Companies, Has Been Chosen to Head Lincoln Highway Association.



Tirometer Touring Tube and Valve.

#### OFFICERS OF INDIA TIRE & RUBBER COMPANY.

At the annual meeting of the India Tire & Rubber Co., Akron, O., J. M. Aldefer was re-elected president. Other directors chosen were J. K. Williams, D. A. Grubb and P. C. Searles.

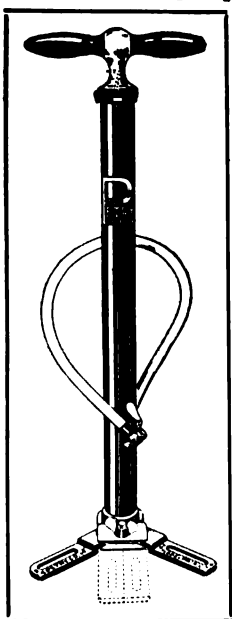
#### THE PETRY, NEW TYPE OF AIR PUMP.

The N. A. Petry Co. Inc., Philadelphia, Pa., has just placed on the market a new tire pump which is stated to be radically different from other types of hand pumps, in that it embodies five distinct features that make for easier operation and quicker service. Of these points of difference, the spreading foot base has perhaps aroused the most interest.

This improvement over the ordinary base now in vogue places the pump suffi-

ciently away from the motorist to allow a natural pumping position. A full, long stroke is possible without touching the body.

Equally important is the exclusive Petry valve. It is not merely "commercially" air tight, but is guaranteed to be air tight. This valve is stated to be put to a factory test of an air pressure of 100 pounds under water before being passed for shipment; it has



withstood a pressure of 150 pounds per inch.

The handle feels right when the motorist pumps, because many tests were made to develop a shape that would fit the hand. The Petry handle does its part to make pumping easier, giving ample thumb room and a round, firm grip.

A handle lock is the fourth feature. With the lock snapped in place the handle tee and plunger are rigidly held, so that the pump may be readily removed from car. The piston is convex shaped to divert the lubricating oil to the sides of barrel for ease of lubrication and greater pressure on the leather cup washer.

The Lox-On connection at the end of the hose with the time valve deflating pin also lessens pumping effort and can be used only on a pump having an absolutely tight check valve. The deflating pin keeps the tire valve open and saves the pumper the effort necessary to unseat the tire valve with each stroke, usually 20 pounds pressure. The hose is 27 inches long and five-ply highest grade rubber tubing, securely fastened at each end by a specially designed clamp that will hold the hose tight.

The finish is baked black enamel with high lustre. All brass parts are polished and lacquered.

The Petry pump is made complete in the Petry factory at 328-334 North Randolph street, Philadelphia, and carries the usual Petry guarantee to make good. The list price is \$5 for 17-inch or 20-inch barrel, with attractive discount to the trade.

#### TIROMETER TOURING TUBE AND VALVE.

It is said that 90 per cent. of the premature tire troubles and a loss of one-third of the mileage of tire casings are caused by under-inflation, yet many motorists keep right on neglecting to see that their tire equipment is in proper condition or still adhere to the antiquated perfunctory test of tire inflation by kicking the casing or simply judge from the tire's appearance.

The Currie Brothers Co. of Atlanta, Ga., is placing on the market a type of tube which is designed to obviate such neglect. This is called the Tirometer Heavy Touring Tube, which, instead of having the ordinary tire valve equipment, has a valve which, as may be seen from the accompanying illustration, includes an air pressure gauge that accurately registers at all times the air pressure of the tire. The transparent dust cap is stated to be practically unbreakable and permits the instant reading of the air pressure.

#### SHALER SUMMARIZES ANTI-GLARE LAW.

The C. A. Shaler Co., Waupun, Wis., well known maker of automobile lamp and lens equipment, recently issued a booklet giving, in convenient form, a concise summary of the standard head lamp which is now in effect in a number of states and is under consideration in

many others, as well as in the Canadian provinces and European countries, and has been approved by the American Automobile association, the National Traffic Officers' association, the Society of Illuminating Engineers, the Society of Automotive Engineers, etc. The summary is as follows:

1. Two Head Lamps Required—All passenger cars and trucks must use two head lamps of approximately equal candle power.

2. Size of Electric Bulbs—Each state usually specifies the maximum candle power of the bulb which is permissible under any conditions and then, by laboratory tests, determines the maximum sized bulbs which can be used with each make of lens without exceeding the limits of glare specified under No. 4.

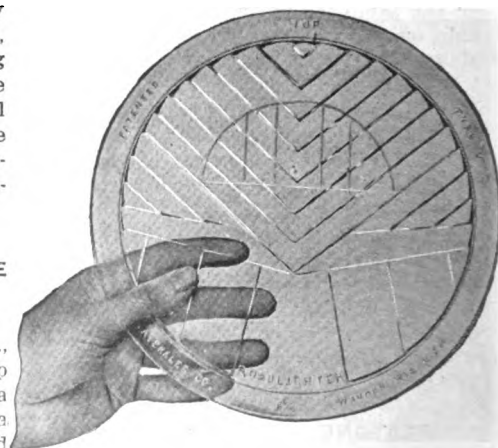
3. Minimum Permissible Road Illumination—A, at 100 feet ahead of the car and between 1½ feet above the road and the level of head lamps, the illumination must be 4800 candle power or more; B, at 100 feet ahead of the car and seven feet to the right and somewhere below the level of the head lamps, the illumination must be 1200 candle power or more.

4. Elimination of Glare—A, at 100 feet ahead of the car and at points five feet higher above the road, the illumination must be less than 2400 candle power; B, seven feet to the left of the above points the illumination must be less than 800 candle power.

It will be noted that this law insists not only upon a glareless light, but there must be, at the same time, sufficient light on the road ahead for the safety of the driver. With this idea in view the Shaler experts have designed the Shaler Roadlighter, which is stated to be distinguished from other anti-glare lenses by the fact that instead of merely complying with all head lamp laws by stopping glare, which could easily be done without any lens at all, it distributes all of the light from the head lamps over a carefully chosen area of the road.

The Shaler has received the highest candle power rating allowed by law in every official state test.

The retail price of the Shaler Roadlighter, Ford size and smaller, is \$2.75 and \$3.50 for all larger sizes.



Shaler Roadlighter Lens, Which Has Been Officially Tested for Anti-Glare.

# HUMOROUS SIDE OF MOTORING

## ANYTHING TO PLEASE THE KIDS.

The usual crowd was gathered round the usual motor car and the usual goggled one was endeavoring to right matters in the usual way.

"Hello!" suddenly cried the voice of a new arrival. "What's the matter, Hobbins—car turned turtle?"

Hobbins smiled with expressive sweetness.

"O, no; not at all, old chap!" he replied. "These kids here wanted to see how the machinery worked, so I had the car turned upside down just to please them."

## MAYBE AUTO INTOXICATION.

"What does autosuggestion mean?" asked Pringle.

"That's when your wife begins to figure out how much you would save in carfare and all that, if you had your own machine," replied Teggard, who had been worked just that way.

## TRY IT OUT, LADIES.

Wife—I made a terrible hit at the club this afternoon.

Hubby—Make a speech?

Wife—No, but I wore my dress that I just had cleaned and the odor of gasoline was so prevalent that everybody thought we had a car. We'll have to get one now, dear.

## WHY THEY STRETCH.

A vulcanizing station in Salinas, Cal., quotes a little story in its newspaper ads under the caption of "Let Rhodes Do It." The story, rich in satire, is quoted below:

"Grandma—Shall I teach you to make doughnuts?"

"Debutante—Yes, I'm terribly interested, but I can't understand how to fix the inner tubes."



## BACK ON HIS FEET AGAIN.

A certain manufacturer who was in a bad way financially, was met the other day by an acquaintance, who asked him in a friendly way how things were going. "Oh, I'm all right," the manufacturer replied. "In fact, I'm back on my feet again." "That's fine," said the acquaintance. "I'm glad to hear it." "Yes," sighed the manufacturer, "I'm on my feet all right. I sold my automobile yesterday."

## TOO KEEN VISION.

"That fellow seems to be an expert repair man."

"His knowledge of automobiles is uncanny," said the citizen who is living beyond his means.

"Yes?"

"Sometimes when he looks at my car I suspect he knows exactly how much a month I'm paying for it."—Birmingham Age-Herald.

## UNDOUBTEDLY.

A bunch of young people were assembled.

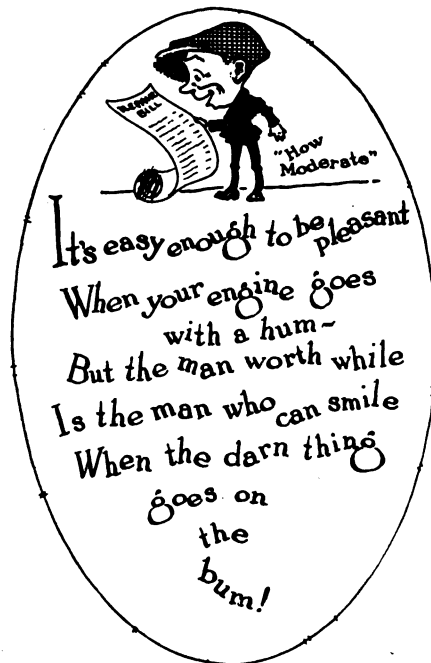
They were talking about clothes, ice cream soda, automobiles, theater.

Were they young men or young women?—Louisville Courier-Journal.

## NO INTRODUCTION NECESSARY.

Jones—Are you sure your chauffeur had your car out without permission?

Mones—I guess I know my own car when it hits me.



## CHORUS GIRL DOES NOT NEED A TRACTOR.

"Mr. Jobbles" said the head of the firm, "I notice there's a considerable item for meals in your expense account."

"Er—I was entertaining customers and prospective buyers, sir."

"All right, I'm not complaining, but I hope you will bear in mind that we are selling tractors, and no lady of the chorus ever buys a tractor."

## WORTH CONSIDERATION.

An American motorist, stopped by a Scotch constable for speeding, hinted broadly that he might pay to be let off.

"What, sir!" cried the constable. "Dae ye suggest that I widge take a bribe? Dae ye dare to insult me, sir?"

"O, excuse me," said the American. "I really—"

"But now," put in the constable, "supposin I was that kin' o' man, how much widge ye be inclined to gie me?"—Galveston Tribune.

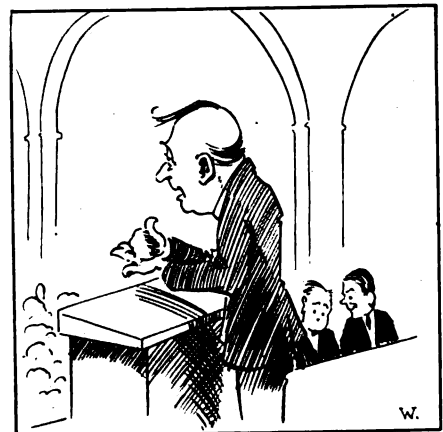
## BACK "ON" HIM, MAYBE.

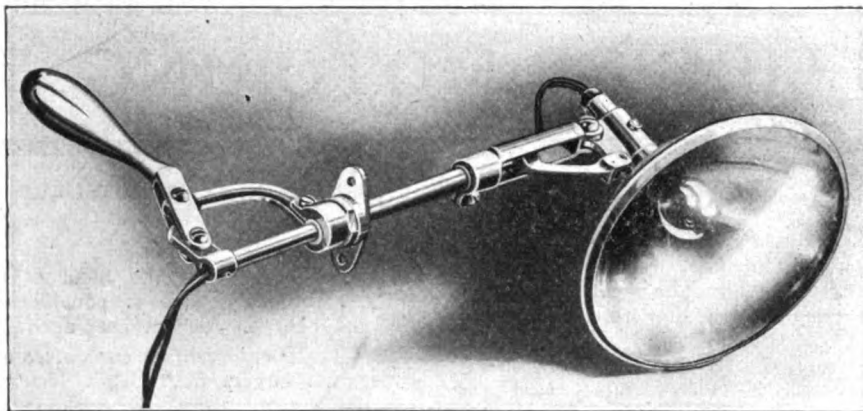
The first time Wilbur Harrison of Columbus, Ind., went out driving in his new automobile he ran into a machine and badly injured a little girl of three, and soon after struck another car and hurt a lawyer. He says he is going to turn his car back to the man from whom he bought it.

## AND IT'S IN THE SOUTH, TOO.

"As has been said so many times before," remarked the clergyman during his address, "hell is paved with good intentions."

"Well," murmured a motoring fiend to his companion, "it's a comfort to know that road improvement has extended that far."—Detroit Motor News.





Cincinnati Inner Control Spot Light, with Sedan Bracket.

#### CINCINNATI INNER CONTROL SPOT LIGHT.

The Cincinnati Inner Control Spot Light is designed so as to be controlled from closed cars of the sedan and curtain types, eliminating all inconvenience in cold or wet weather.

The bracket, designed for attachment to sedans of all models, is all brass, nickel plated, with the exception of the handle, which is polished aluminum. All reflectors are spun from 22-gauge brass, silver plated and highly polished. The convex lens is held in place by a nickel plated ring; weight, two pounds.

The touring car bracket is of aluminum, polished, with the exception of the clamp, which is brass, nickel plated. It has the same reflector as the sedan model, and its weight is two pounds. It will fit all types of touring cars.

The Inner Control Spot Lights are manufactured by the Cincinnati Lamp & Bracket Co., northwest corner of Third and Race streets. Prices and literature on request.

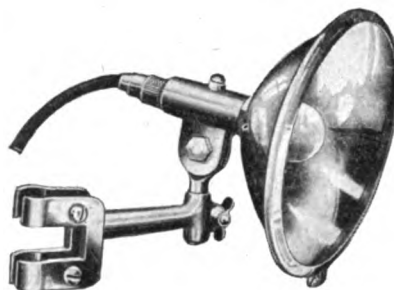
#### THE NEW SEDAN COACH.

Horace C. Mills, formerly distribution manager for the General Top Co. of Cleveland, O., is showing his friends in the industry his perfected design of sedan coach. The sedan coach is being manufactured by the Andrew C. Sissman Co. of Detroit, with whom Mr. Mills is now associated as sales manager.

#### MECHANICAL CONVENTION AT PIERCE-ARROW FACTORY.

Pierce-Arrow distributors' service men from all over the country recently attended a mechanical convention which was held at the factory of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., under the auspices of the service department. The object of this meeting was to qualify the distributors, through their mechanical service men, to become thoroughly acquainted with the design and construction of the latest Pierce-Arrow models of passenger cars and trucks and thus put them in a position to give effective service in keeping the vehicles in satisfactory operation for their owners. And these conventions proved so valuable from the first that they have

now become annual features, at which service men, distributors and fleet owners are given a thorough course of instructions. They become better acquainted with the factory, its methods and its organization and so become one with it in method, ideals and spirit.



K-D Delight Spot Lamp.

The programme this year was varied and full of action and interest, being divided between lectures, shop demonstrations and road tests.

#### K-D DELIGHT SPOT LAMP.

One of the products that is now being featured by the K-D Lamp Co., 108 West Third street, Cincinnati, O., maker of the well known K-D line of automobile lamps, is the Delight Spot Lamp, which is illustrated herewith. The lamp is of the latest form of construction, single shell type. The reflector is pressed from brass, of proper gauge, polished and silver plated. The glass is convex, held securely in place by a nickel plated

band. The bracket is K-D special design, made from brass and nickel plated. As it will be noted that all parts of this lamp are made from brass and nickel plated it is therefore rust proof.

The bulb is 6-8-volt 21 candlepower Mazda "C," double circuit. Five feet of cord are supplied with each outfit. The list price is \$9.

#### PERFECTION HEATERS AT SHOWS.

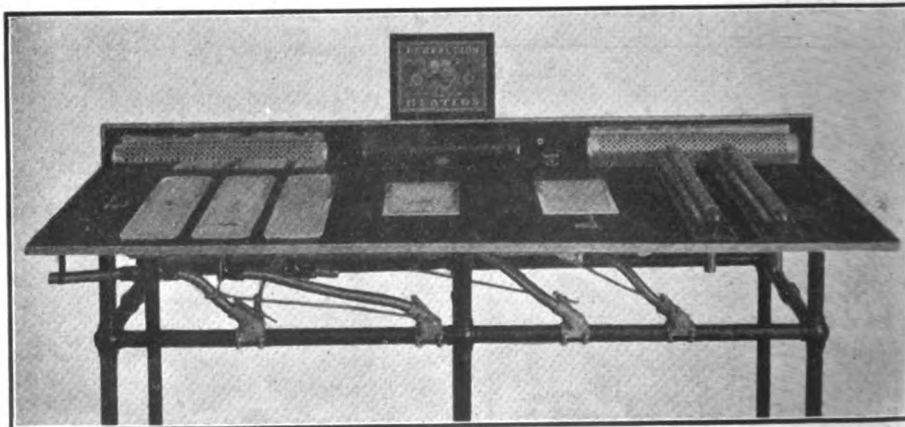
The accompanying illustration shows the display of heaters made by the Perfection Heater & Manufacturing Co., Cleveland, O., at the New York and Chicago automobile shows. It is stated that there were not less than nine varieties of this make, the Perfection, seen on 50 of the 88 makes of cars displayed at New York, and the same conditions were in evidence at Chicago.

"It is just as unreasonable—and as unnecessary, too,"—says C. S. Pelton, vice president of the Perfection Heater and Manufacturing Co. of Cleveland, "to ask any one kind of heater, or one particular size of valve, to adapt itself to all makes of cars, as it is to make the same request of any one size of carburetor or muffler. The latter idea would not appeal for a moment to any owner of a machine who cared a cent about the welfare of so valuable a friend; neither does the first—now.

"Structural and other features need not be disregarded. At least one type of Perfection heater will be suitable for installation on any passenger car or truck on which it is possible to use a heater. Perfection heaters have already been adopted as standard equipment on 47 motor trucks."

#### MOTOR WHEEL PROFITS.

The Motor Wheel Corporation has issued its first report covering 10 months ended Dec. 31, 1920. It shows net profits of \$877,424 after deductions of all charges except Federal taxes. After allowing \$394,476 for depreciation of inventory and \$49,092 for Federal taxes, the amount available for the capital stock is \$433,856. This after payment of preferred dividends equals 54 cents per share on the 450,000 shares of common.



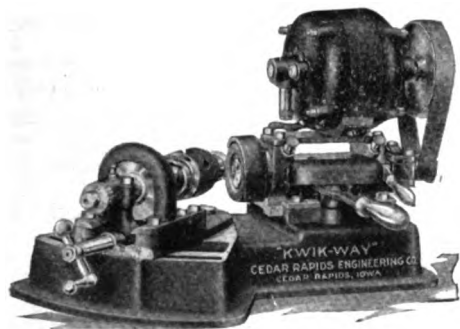
Display of Nine Varieties of Perfection Heaters Exhibited at the New York and the Chicago Shows.



# ACCESSORIES DEPARTMENT

**The Kwik-Way Valve Facing Machine** has recently been perfected and is now being built for the purpose of refacing motor valves preparatory to grinding. The valve is held by an especially designed chuck and rotated while the face is being trued up with a high speed grinding wheel. The chuck shaft, grinding wheel and motor are mounted on a symmetrical cast iron base. Electric current may be obtained from any lighting circuit.

The base is a one-piece casting, heavily ribbed and reinforced, insuring rigidity and freedom from vibration, features positively essential to obtain accuracy. The grinding wheel shaft or spindle is hardened and ground to an accuracy of one-half thousandth of an inch. It runs on high grade ball bearings, made dust proof and packed in grease.



The grinding wheel is of special shape, with a special grit, produced expressly for this machine by the Norton company. These wheels are regularly stocked by the manufacturer as well as ourselves.

The engineering force has designed a chuck that will properly center a worn valve for refacing. It is really two universal three-jaw chucks in one, working independent of each other. This especially designed and patented chuck centers the valve stem at two points  $2\frac{1}{4}$  inches apart on that section of the valve stem that works in the valve guide. This insures extreme accuracy in centering a used valve for refacing. The chuck and chuck shaft are one unit. All parts are hardened and ground, being held to the closest possible limits for accuracy. The chuck shaft runs in reamed bearings, adjustable for wear, and is driven at a speed of 200 revolutions per minute by a set of worm gears from the grinding wheel shaft, which has a speed of 6000 revolutions per minute. Both grinding wheel shaft and chuck shaft are mounted on sliding carriages, the ways of which are gibbed to compensate for wear. The grinding wheel is moved across the face of the valve by means of a hand lever on front of carriage. The adjustment of the valve relative to the face of the grinding wheel is accomplished by turning the small crank at the left end of the chuck carriage.

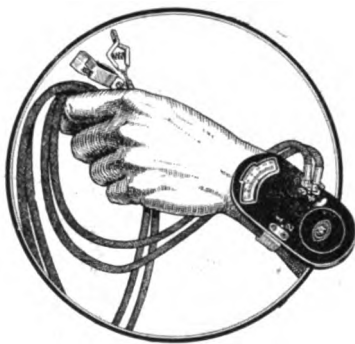
This machine will take any size valve up to and including three-inch head and one-half inch stem. It will true up the face of a valve at the rate of one a minute. By means of the graduated dial the machine can be set to grind any angle from 25 to 65 degrees. The machine has a direct motor drive through a friction clutch pulley on the grinding wheel shaft.

The same care and accuracy are stated to be incorporated in its manufacture as that employed in making the highest grade of machine tools.

Manufactured by the Cedar Rapids Engineering Co., Cedar Rapids, Ia. Literature and prices on request.

**The Onan Wrist Meter** is a compact little device that should appeal to every mechanic, garage and repair shop man in that it affords a practical testing instrument of the various electrical components of the car. It is worn on the wrist like a watch and is always at hand the instant it is wanted.

As will be noted from the cut, it is a combination instrument, comprising an ammeter automatically protected against burn-out, a circuit signal which will indicate a circuit or the absence of the same, an automatic breaker with condenser for testing all kinds of ignition systems, spark plugs, secondary parts or even for starting a high-tension magneto with the use of battery current, as well as a storage battery drop tester. In short, it is



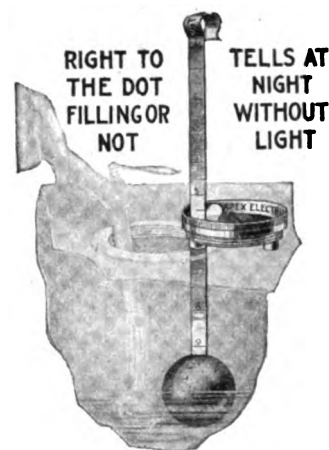
stated to be to the mechanic what a thermometer is to a doctor, and is just as well made as a watch. Each device is accompanied by an instruction book full of shop kinks gained from experience in this class of repair work.

Manufactured by David W. Onan, 43 Royalston avenue, Minneapolis, Minn. List price, including test cables and instructions, \$15.

**The Apex Gasoline Gauge** for Ford and Chevrolet cars is claimed to be designed in such a manner as to insure accuracy at all times and under all conditions, at the same time with the least possible number of operating parts. Among its many features of decided importance attention is called by the maker to its ex-

treme simplicity, the ability of the driver to ascertain the contents of the gasoline tank in the dark, as well as by day light, and convenience of reading the gauge while filling the tank. It is not necessary to remove the gauge while filling.

The best grade of material is guaranteed to be used in the construction of the

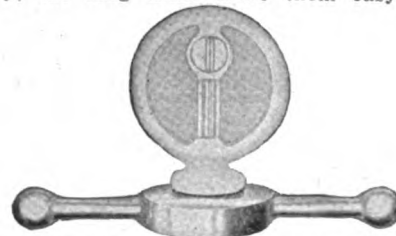


Apex Gasoline Gauge. The indicator is of imported clock tempered spring steel and the indicating figures, are etched thereby assuring a permanent and accurate graduation.

No tools are necessary for the installation of the Apex gauge; the old radiator is simply replaced by the device.

Manufactured by the Apex Electric Manufacturing Co., 1410 West 59th street, Chicago, Ill. List price, \$1.

**The Illinois Racing Type Radiator Cap** for all makes of cars, which is shown in the illustration, is one of a number of types made by the Illinois Brass Manufacturing Co. and combines the features of practicality, classy appearance and durability. The Illinois Radiator Caps are made of special Illinois nickel silver alloy; the long arms make them easy to



unscrew and they will not burn the fingers when the radiator is hot; there is no nickel plate to wear off and no rubber to crack or melt.

The company also markets the Durable Hub Cap and the Stutz Spare Wheel Lock Arm.

Manufactured by the Illinois Brass Manufacturing Co., 224 North Ada Street, Chicago, Ill. Prices on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The No. 028 Medium Weight Khaki Outerall**, shown herewith, is one of the popular forms of Outerall Economy garments for motorists and repair men. It is especially suited to the needs of the regular garage mechanic and repair man, and its detailed description is as follows:

Jacket collar and patch pockets, four in front and two in back; combination watch and pencil pocket; convenient rule pocket; two-button cuff; special side opening for giving easy access to pants pockets; all pockets double stitched and reinforced; all seams double stitched and felled, giving double strength and no raw edges; upper sleeve extra large, permit-



ting easy movement of shoulders; no binding when stooping or in other working positions. Fast color; best grade khaki cloth. All buttons protected throughout to prevent scratching of smooth surfaces. Sizes, 34, 36, 38, 40, 42 and 44. Extra sizes furnished upon request at additional charge.

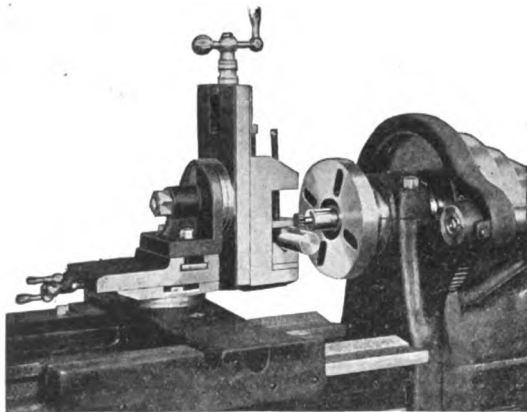
This thorough construction is typical of the entire Outerall line, which includes a nobby tourist motor coat, and there is a special garment for every trade.

**Manufactured by the Michigan Motor Garment Co., Greenville, Mich. Description and prices of full line on request.**

**The Barnes Milling Attachment** fits any of this make of sliding extension gap lathes which are now in use; i. e., 12-22 inch, 13-22 inch and 14-24 inch, and can also be fitted to other makes of lathes, 12 inch to 18 inch, equipped with compound rests.

The milling attachment is stated to be a very handy vise for a wide variety of work, including the cutting of seats for Woodruff keys, splining and squaring shafts, sawing, splitting bushings and drilling and boring small parts.

The illustration shows the style of mounting used at present. The vise



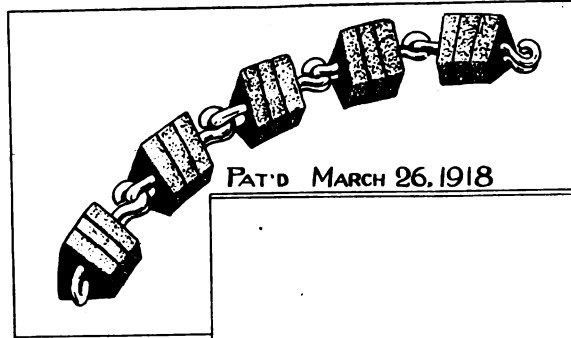
swivels and is graduated 180 degrees in the vertical planes, while the collar on the vertical screw is graduated in one-thousandths of an inch.

The equipment consists of the milling attachment, complete, as shown, with steel V block steel plate, gib and bolts for attaching and ball crank handle. Cut-

ters and arbors are not included. Specifications: Vertical feed, six inches; cross feed, 12 inches; vice will hold 4½ inches; depth of jaws, 1¾ inches; width of jaws, five inches.

**Manufactured by the Barnes Drill Co., 814-830 Chestnut Street, Rockford, Ill. Prices and literature on request.**

**Master Link 10000 V Belting for Fans** is made from selected sole leather and steel wire links. The steel links are embodied into the leather V shaped blocks in such a way as to prevent the steel from touching the pulley at all, the leather blocks doing all the gripping and at the same time not being subjected to any



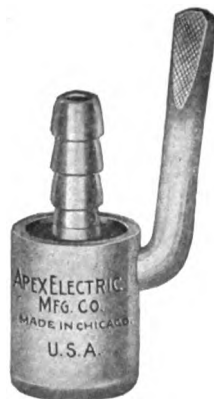
bending or strain whatever, as the bending is all done at the link joints and the strain is all on the steel links. This makes it very powerful in tensile strength and the caterpillar link principle gives it a superior fan pulling ability.

Every link is a new pull and it is claimed to be impossible for this belt to slip on the pulley. The leather-V shaped blocks wedge into the pulley, grabbing and gripping it with the tenacity of a bull dog—the pulley has simply got to travel if the belt travels. And the belt does not necessarily have to be fitted tightly on the pulley. In fact the maker recommends only a moderately tight adjustment.

Master Link V-Belting is furnished on spools containing 25 feet. It can be easily disconnected with screw driver or similar tool and easily reconnected, making any length of belt desired. No special tools are required. It is guaranteed to run 10,000 miles.

**Manufactured by the Master Link Belt Co., Oklahoma City, Okla. Prices, per foot: ½ inch, retail, 60 cents; wholesale, 40 cents; ¾ inch, retail, 75 cents; wholesale, 50 cents.**

**The Apex Pump Connection** can be instantly attached to the tire valve by a half turn of the lever which compresses



the rubber bushing, fastening the connection securely to the tire valve, thereby permitting it to become positively locked, so that it will not leak nor blow off. An upward turn of the lever releases the connection. There are no threads to become burred.

The Apex connection will fit on any

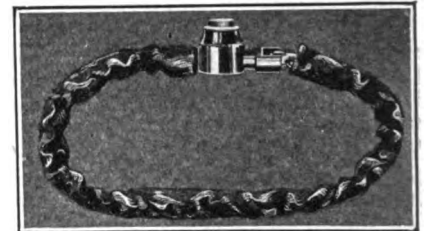
(When Writing to Advertisers, Please Mention the Automobile Journal.)

tire valve and is claimed will positively hold tight under any pressure. Owing to its construction it can be conveniently used on wire wheels as well as disc.

The best grade of material is used and the device is guaranteed against any imperfections.

**Manufactured by the Apex Electric Manufacturing Co., 1410 West 59th street, Chicago, Ill. Price, 35 cents each.**

**The Able Chain Tire Lock**, as will be seen from the illustration, is a chain loop of sufficient size to attach a spare tire in its case or rack to an adjoining substantial part of the car frame, and is, furthermore, equipped with a special com-



bination theft proof bar lock. The following extract from the report of the Underwriters' Laboratories on this device will show its efficiency under the strenuous tests of this organization:

"1. The steel chain forming the loop resisted all attempts to cut it with bolt cutters.

"2. It was impossible to even start the hack saw blade in the material or to mark it with a file.

"3. No success was had in the attempts to break the lock or loop with a two-pound machinist's hammer.

"Practicability: The installation tests show that the ordinary automobile owner can install this device in a few minutes' time without the use of any tools. The locking of the tire by this device does not require the use of a key, thereby eliminating the possibility of the automobile owner forgetting or losing the key.

"Durability: This device is capable of withstanding the deteriorating effects of wear and tear for a reasonable period of time. The device is made of a good grade of material. It is therefore believed that this device will be sufficiently durable to last for the life of the automobile on which it is used.

"Summary: From the conclusions drawn it will be noted that this device is practical to install and use; that it is durable and that it is uniformly manufactured."

**Manufactured by the Able Manufacturing Co., Inc., 731 Folsom street, San Francisco, Ill. Prices on request.**

**The Red Devil Cotter Pin Extractor** is designed to fill an essential place in the tool kit of every motorist. When it is realized that in an average car at least 80 cotter pins are used and that they frequently become rusted or lost in the process of repairs, thus making frequent replacements necessary, it will be readily seen that some such device as the Red



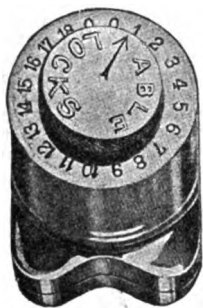
Devil Cotter Pin Extractor is as worthy a place in the motor car equipment as a jack or tire pump. The Red Devil is strongly made from octagon tool steel, 90-point carbon Swedish analysis.

**Manufactured by the Smith & Hemenway Co., Inc., Irvington, N. J. Price on request.**

The Able Combination Auto Lock is a compact device made of high grade bronze; the working parts cannot rust or corrode. It becomes a permanent part of the car and will last the life of any car upon which it is installed.

It is as easy to lock or unlock the Able combination as it is to turn on the batteries—but it is absolutely impossible to unlock it without knowing the combination. The combination device on the Able lock is non-pickable and positively theft proof.

Few people will bother to use an auto lock that requires the least inconvenience in locking or unlocking. One failure to lock may be fatal. The Able Combination



Auto Lock gives security without inconvenience. It is easily and quickly operated from the seat and there is no mud, dust or grease to soil hands, gloves or clothes.

The Able lock is placed in such a position on the steering post that it is practically impossible to use a cold chisel, hack saw or Stillson wrench on it in an effort to break it from the steering post and thus unlock the car.

The driving tests showed that a thief would be unable to steer the car in such a manner that he could drive for any considerable distance down the street, nor could he turn a corner in order to get the automobile to a point where he could work on it at his leisure.

Manufactured by the Able Manufacturing Co., Inc., 731 Folsom street, San Francisco, Cal. Prices and literature on request.

The Halladay Twin-Bar All-Steel Truss Spring Bumper is designed to appeal to anyone desiring a bumper of massive appearance and exceptional strength, without unnecessary weight. The truss spring bumper feature is still retained, as it is considered by the maker to be positively the best type of construction to stand the severe concussions to which a bumper is subjected. The flexibility of a double, full length spring steel bar of highest grade insures the greatest possible protection.

The fittings of this bumper are also made of spring steel, thus presenting an all-steel construction, eliminating breakage. It is handsomely finished in either



black japan with nickel end caps and name plate bolts, or buffed nickel plate over a heavy coat of buffed copper, preventing rust.

The Halladay Twin-Bar Bumper is supplied complete, as shown in cut, or the manufacturer will furnish it with any other of the regular Halladay fittings, either front or rear. It is packed in a standard carton, four by six by 60½ inches, and is shipped in cases containing 10 cartons each unless otherwise specified. The weight of the bumper bar is only 26 pounds.

Manufactured by L. P. Halladay Co., Streator, Ill. Price, with any style fittings: Twin-bar, two by 5/16 inch, Japan finish, \$16; nickel plate finish, \$18.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Allen Combination Gas-Air Blow Torch, Soldering and Branding Tool, for either gas or gasoline, is stated to be a new device equally well adapted for precision, medium or broad surface work. Heat is projected into an opening inside the shank of the tip of the tool, keeping the outside surface of the tip clean and at an even heat and free from carbon. Its use obviates the frequent going back and forth to the fire, whether the tool is required as a portable or stationary equipment. The temperature range is 1300 to 1900 degrees Fahrenheit.

The flow and proportioning of air and gas are under positive control and intense heat is concentrated at a point. Rapidity of operation and fuel economy are claimed for the Allen tool. All parts are interchangeable and flexible steel tubing may be supplied in any length for air and gas.



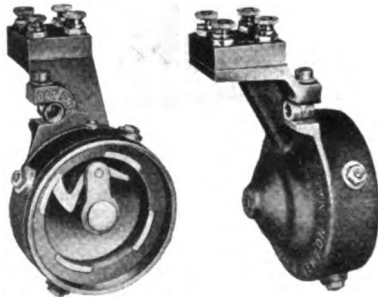
It may also be supplied with a holding post which holds the torch, leaving both hands free for the manipulation of the work. The tool may be raised or lowered, on the post, tilted up or down or swung in a circle. Cups are also attached to this post convenient for holding flux.

Soldering tips of pure copper, cast or wrought, are supplied, standard or special, as extras, either straight or elbow.

The Allen gas soldering tool, blow torch and branding tool is also supplied for gas only, with a temperature range of 1290 to 1700 degrees Fahrenheit.

Made by the L. B. Allen Co., Inc., 4521 North Lincoln Street, Chicago, Ill. Literature and prices at request.

The Newton Timer for Ford Cars, front and rear views of which are shown herewith, presents, among other features, a bone fiber terminal block mounted on a hollow arm projecting from the main part of the case, which is made of cast iron, and in the terminal block are four numbered terminal screws, each connected by an internal wire to its corresponding contact segment of the contact race. This race is of the usual construction, consisting of a bone fiber ring and steel contact segments set into the ring. With this design the lead wires are removed from contact with oil and dirt in the drip pan and kept from chafing against the adjacent parts of the engine. The rotor or contact assembly consists of a brass composition brush holder and a special bronze alloy brush; the latter is actuated and pressed into contact by a steel wire spring coiled about the pivotal pin of the brush, the ends extending outwardly, one end bearing against the barrel of the brush holder and the other end against the arm of the brush. The design of the brush is stated to be such as to allow a generous amount of wearing material and, as the brush wears, continually presents a forwardly projecting cleaning edge, which keeps the contact race bright. By the bronze brush making contact with the steel and also by reason of the peculiar shape of the brush, an excellent electrical contact is said to be made and the wear of the contact race is very slight and uniform in character.



The principle amount of wear occurs on the brush, which is guaranteed by the maker to be good for 10,000 to 15,000 miles of service, and as the case will out-

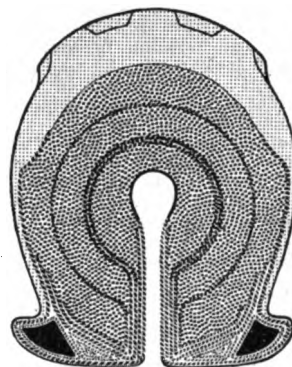
live several brushes, it is evident the device is economical as well as efficient. A steel bearing for the operating rod is provided and held in place in a slot in the arm by a conical pointed clamping screw, the point of which engages with a groove in the bearing piece. The oiler is placed at the top of the case at the rear of the projecting arm.

Manufactured by the Newton Timer Co., 42 Parsons Street, W. Newton, 65, Mass. Retail price of timer, complete, consisting of case and contact assembly, \$3.50; extra contacts, 75 cents.

The Liberty Airless Tire is a tubeless cushion tire of high resiliency, composed wholly of rubber and fabric, and with a small central cavity to further increase easy riding.

Tested side by side with a properly inflated pneumatic it is said to be fully as resilient.

The tread and outer walls are composed of extremely tough and wear-resisting



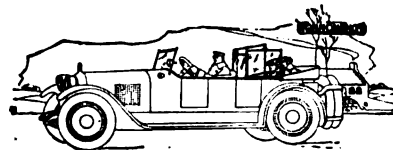
rubber, and the interior consists of highly resilient red rubber, reinforced by layers of fabric.

The tire looks exactly like a pneumatic on the wheel, and is interchangeable with any pneumatic on the same rim.

Being airless, it cannot puncture, or blow out, it is stated, and its makers report an average mileage in service between 25,000 and 30,000 miles with no trouble, care or repair.

This tire is manufactured by the Liberty Airless Tire Corporation of Carey, O., who has just completed and put into operation a modern three-story plant.

Gemco Tonn-O-Wings. A device recently placed on the market, is stated to be meeting with success from dealers and jobbers handling it. Tonn-O-Wings are attached in a few minutes time to the top rest at each side of the tonneau. They are so designed that a 12-inch wing of plate glass can be adjusted to any position desired by the occupants. In this way complete pro-



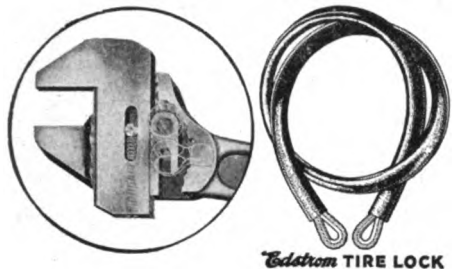
tection from the discomforts usually found in driving is afforded, but a conversation can be easily carried on between the occupants of the front and those of the rear seat.

A big feature of this device is that the wings can be quickly and easily attached without changing or damaging the car. This gives it the added advantage of being inexpensively and easily installed.

Tonn-O-Wings are made in four sizes, ranging in price from \$51 to \$60, and the manufacturer will be pleased to make recommendations to car owners if furnished the make and year of the car for which the wings are desired.

Manufactured by the Gemco Manufacturing Co., Milwaukee, Wis. Circulars on request.

**Edstrom Tire Locks** are stated to be made from the same high tensile strength aeroplane strand of wire cable as the Kantkick Towline, with the ends machine wire wound to prevent fraying and the lock is covered with a high grade



Edstrom TIRE LOCK

of chrome tanned leather, which harmonizes with the car finish.

Another article manufactured by this company which has superior merit is the pipe wrench, which is fitted with special jaws for pipe and round stock. It is stated that the wrench is instantly adjustable and locked by the action of the thumb lever. The improved jaws are made of tool steel, easily replaced when worn at small cost.

Manufactured by Jessop & Thompson, 1421 South Michigan Ave., Chicago, Ill. Prices of the tire lock, 36 inch length, \$1.75 each; 42 inch length, \$2.10 each. Price of wrench on application.

The Kantkick Towline is claimed by the manufacturer to be the big-little towline that is guaranteed not to kink, snag or snarl. It is big in service and small in bulk, which is made possible



Edstrom KANTKICK TOWLINE

by the special Roebling aeroplane strand of high tensile strength, from which the towline is made.

A feature of the towline that recommends it to motorists is that the towline will uncoil straight and when folded stows in a small space in the car. The ends are machine wrapped to prevent the ends from fraying and are fitted with manilla rope slings and special hooks for quick hitching to the car axle.

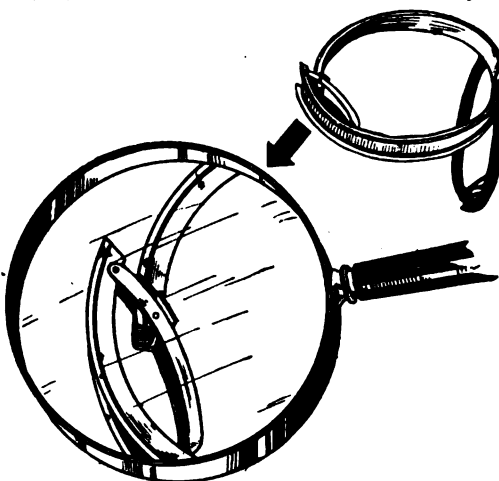
Made in three sizes for the Ford, touring car and heavy trucks.

Manufactured by Jessop & Thompson, 1421 South Michigan Ave., Chicago, Ill. Prices according to size, \$5, \$6.50 and \$9.50.

**Raymond Demountable Rims** operate on an improved principle which renders them distinct from others of the split type in that a U shaped lever is provided which affords an exceedingly easy method of reducing the circumference of the rim, allowing an easy slip-off or slip-on of the tire. This patent lever device, when the tire is on the rim, acts as a lock to hold the rim ends in alignment.

It will be noticed that the lever oper-

ating the rim extends out from the flange of the rim. To mount on the felloe band already on the wheel, place the Raymond rim on the felloe band, allowing the drive member to seat (this driving member may be either a depression or a stud drive) properly in the felloe band, carefully mark the position the extending end of the lever strikes the felloe band. By



taking an ordinary monkey wrench or a hammer the edge of the flange of the felloe band can be bent so as to allow the rim to seat on the felloe band perfectly.

The three points of superiority claimed for the Raymond are, first, that it is possible to change a clincher tire without the aid of a tire tool in a moment's time; second, that the materials entering into its construction, together with the thorough workmanship required, insure a surplus of strength far in excess of actual requirements; third, that, as reducing the circumference of a rim is the simplest method known to modern engineering in making a tire change, by designing this patent rim to perform this duty of a circumference reducer as well as a rim lock, an idea has been evolved which makes the device so simple a child can operate it.

The Raymond demountable rims are designed to accommodate all sizes of clincher rims.

Manufactured by the Raymond Rim & Wheel Co., Jackson, Mich. Prices and literature on request.

The **Lincoln Tire Gauge** is a scientifically designed precision instrument intended to make tire inflation an easier and more satisfactory operation. This is accomplished by eliminating alternate inflating and testing. In service it is only necessary to set it for the pressure desired, fasten it to the tire valve by the



simple movement of a lever and turn on the air, which enters through the check valve at the top. A whistle notifies the operator when the tire is inflated.

To set the knurled head is turned to right or left, micrometer fashion, for the exact pressure desired. The body of the gauge is hard brass, finely polished and nickel plated, while compression springs are made from crucible steel wire.

Manufactured by the Lincoln Products Co., 101 Massachusetts Avenue, Boston, Mass. Price and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The **Halburn Adjustable Reamer** is an improved valve seat reamer with an expansion of wide range. It is asserted by the manufacturer. Other claims made for it are that this one tool will do more work than four sets of solid reamers, thus effecting a saving of 80 per cent.; and it is quickly adjusted to dimension by the turning of two nuts, after which the cutters are locked in position by turning one of these nuts—a simple, quick operation.

The Halburn adjustable reamer is designed for strength; the cutters are properly hardened and ground tool steel that slide in a slot having a 45-degree base. This brings the pressure against the solid body of the tool, making it impossible for the cutters to flip out, it is stated, and giving the same effect as a perfectly solid tool. Owing to the cutters seating in a 45-degree slot, the pressure drives them toward the center, preventing them from getting out of alignment. The center stem is solid throughout, giving, it is claimed, absolute accuracy to the guiding of the cutters. The pilot stems are made



interchangeable by slipping them over the solid stem. A cross bar wrench is supplied so that the pressure will be directly over the center of the tool. The tool can be lowered through a small port hole and expanded after it is inside the port.

The 45-degree cutters are specially designed to cut all regular 45-degree valve seats. The base is only 1 1/16 inches, small enough to be used in the Northway engine. Interchangeable cutters for 30 and 60 degrees and concave cutters for the Fordson tractor can be supplied at a slight additional cost. The cutters can be quickly sharpened.

The Halburn Adjustable Reamer is packed in a substantial box and is accompanied by full instructions. Two sets of 45-degree cutters, 5/16, 3/4 and 7/16-inch pilot stems, and wrench are included.

Manufactured by the Halburn Co., 317 West Pico Street, Los Angeles, Cal. Price, \$12; extra cutters, \$2 a set of eight (mention whether large or small); extra pilot stems, any size, \$1 each; cutters resharpened, 25 cents a set.

The **Apco Valve Grinder for Ford Cars** offers new features in this type of tool that will appeal to expert repairmen and



motorists who do their own valve grinding.

When in operation the Apco grinder holds the valve firmly so that it may be raised from its seat. A universal joint makes possible the grinding of the last valve, while the revolving disc under the handle prevents the hand from slipping down, when turning the handle between the palms of the hands. The grinder is well finished, weighs one pound and measures 12 inches over all.

Manufactured by the Apco Manufacturing Co., Providence, R. I. Price, 50 cents each.



# DIRECTORY OF PASSENGER CARS

*Names, Addresses and Personnel of Manufacturing Concerns with the Trade Names, Models, Types, Capacities and Prices of Vehicles.*

Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
<b>Allen Motor Car Co., Columbus, O.</b>				<b>Birch Motor Car Co., Inc., Chicago, Ill.</b>			
Allen	43	5-Pas. Tour	\$1,595	Birch	Light Six 66	5-Pas. Touring	\$1,695
	43	Sedan	2,345		Light Six 66	3-Pas. Roadster	1,695
	43	Art Craft	2,045		Light Six 66	4-Pas. Sport	1,745
		Chassis	1,260		Light Six 66	7-Pas. Sedan	2,495
Gen. Man., C. R. Miller.		Ad. Man., F. I. Lackens.			Light Six 66	2-Pas. Roadster	1,695
Sales Man., R. G. Ewell.		Export Man., Frank Harshaw.			Light Six 66	5-Pas. Sedan	2,450
					Light Six 66	2-Pas. Cabriolet	2,100
<b>American Motor Corp., Plainfield, N. J.</b>				<b>Bradley Motor Car Co., Chicago, Ill.</b>			
American	C	5-Pas. Tour.	\$2,395	Bradley	H	5-Pas. Touring	\$1,265
	C	7-Pas. Tour	2,475				
	C	Roadster	2,395				
	C	Sedan	3,495				
	C	Coupe	3,295				
	C	4-Pas. Sport	2,595				
President, Robert Bursner.		Ad. Man., H. O. Nadler.		<b>Brewster &amp; Co., Long Island City, N. Y.</b>			
Vice Pres., Proctor W. Hansl.		Export Man., J. H. Giles.		Brewster	91	Panel Qu. Brougham	\$10,700
Vice Pres., Guy Morgan.		Pur. Agent, T. C. Miller.			91	Country Brougham	10,500
Treasurer, Proctor W. Hansl.		Prod. Man., Hiram Browne.			91	Landaulet Town	10,700
Secretary, George G. Gates.		Gen. Man., Guy Morgan.			91	Landaulet Touring	10,600
Sales Man., C. M. Graham.					91	Tour. Landaulet Special	10,500
					91	Limousine	10,600
					91	Landaulet Limousine	10,900
					91	Enclosed Drive Double	10,500
					91	Enclosed Drive Single	10,500
					91	Open Phaeton	9,000
					91	Club Runabout	7,900
				President, William Brewster.		Ad. Man., F. H. Buell.	
				Vice Pres., J. K. Choate.		Export Man., F. H. Buell.	
				Treasurer, T. B. Brewster.		Pur. Agent, A. Borlatti.	
				Secretary, T. B. Brewster.		Prod. Man., J. P. Ripling.	
				Sales Man., F. H. Buell.			
<b>Anderson Motor Co., Rock Hill, S. C.</b>				<b>Briscoe Motor Corp., Jackson, Mich.</b>			
Anderson	A	7-Pas. Tour.	\$2,195	Briscoe	4-34	Touring	\$1,285
	B	Coupe	3,200			Roadster	1,285
	C	5-Pas. Tour.	2,145			Sedan	1,855
	D	Roadster	2,195				
	E	Sedan	3,200	President, H. F. Wardwell.		Ad. Man., W. S. Sherwood.	
	G	Sport	2,175	Vice Pres., J. R. Findlater.		Export Man., C. L. Thurston.	
President, J. G. Anderson.		Ad. Man., W. A. Anderson.		Treasurer, John Fletcher.		Pur. Agent, F. B. Wedow.	
Vice Pres., J. W. Anderson.		Export Man., K. L. Camp.		Secretary, L. E. Latta.		Prod. Man., J. C. Cunningham.	
Treasurer, C. J. Henry.		Pro. Man., W. E. Hall.		Sales Man., J. R. Findlater.			
Secretary, C. J. Henry.		Pur. Agent, J. L. Sealy.					
Sales Man., W. A. Anderson.							
<b>Apperson Automobile Co., Kokomo, Ind.</b>				<b>Bulck Motor Co., Flint, Mich.</b>			
Apperson	821	4-Pas. Sport	\$3,500	Bulck		Roadster	\$1,795
	821	7-Pas. Tour.	3,500			5-Pas. Touring	1,795
	821	Anniv. Tourster	4,250			3-Pas. Coupe	2,585
	821	Anniv. Tour.	4,250			5-Pas. Sedan	2,895
	821	Sedanette	4,500			4-Pas. Coupe	2,985
	821	Sedan	4,500			7-Pas. Touring	2,065
						7-Pas. Sedan	2,295
President, Edgar Apperson.		Ad. Man., R. M. Kelvie.		<b>Bull Tractor, Madison Motors Corp., Anderson, Ind.</b>			
Vice Pres., T. E. Jarrard.		Export Man., George H. Strout.		Madison		Touring	\$1,550
Treasurer, A. G. Dawson.		Pur. Agent., A. C. Donnelly.					
Secretary, A. G. Dawson.		Prod. Man., H. H. Crites.					
Sales Man., R. M. Kelvie.							
<b>Argonne Motor Co., Jersey City, N. J.</b>				<b>Bush Motor Co., Chicago, Ill.</b>			
Argonne		Touring Car	\$4,000	Bush	4-E	Touring	\$1,245
					4-E	Roadster	1,245
<b>Auburn Automobile Co., Auburn, Ind.</b>					6 De Luxe	Touring	1,575
Auburn	6-39-H	Touring Car	\$1,895		6 De Luxe	Roadster	1,575
				President, John H. Bush.		Secretary, M. B. Bush.	
<b>Austin Automobile Co., Grand Rapids, Mich.</b>				Vice Pres., B. C. Wray.		Sales Man., J. H. Bush.	
Austin	12	Touring Car	\$4,250	Treasurer, M. B. Bush.			
<b>Automotive Products Corp., New York City, N. Y.</b>				<b>Cadillac Motor Car Co., Detroit, Mich.</b>			
Alsace	..	Touring	\$1,555	Cadillac	59	7-Pas. Touring	\$3,940
					59	4-Pas. Phaeton	3,790
<b>Balanced Valve Motor Co., Milwaukee, Wis.</b>					59	2-Pas. Roadster	3,790
President, W. M. Baumheckel.		Treasurer, E. W. Eberhardt.			59	4-Pas. Victoria	4,540
Vice Pres., G. B. Rusco.		Chief Eng., W. M. Baumheckel.			59	4-Pas. Sedan	4,950
Secretary, G. E. Piper.					59	7-Pas. Suburban	5,190
					59	5-Pas. Limousine	5,290
<b>Barley Motor Car Co., Kalamazoo, Mich.</b>					59	5 Pas. Town Brougham	5,690
Roamer	Six-54E	.....	.....		59	5-P. Imperial Limousine	5,390
	475 E	.....	.....		59	125 inch chassis	3,360
					59	132 inch chassis	3,460
<b>Beggs Motor Car Co., Kansas City, Mo.</b>				President, R. H. Collins.		Pur. Agent, Harry Main.	
Beggs-Six	20-T	.....	.....	Assist. Treas., D. C. Smith.		Prod. Man., G. H. Lang.	
President, S. M. Beggs.		Ad. Man., E. R. Sandusky.		Sales Man., Lynn McNaughton.		Chief Eng., B. H. Anibal.	
Vice Pres., G. C. DeLooze.		Export Man., E. R. Sandusky.		Ad. Man., John Cleary.			
Treasurer, E. R. Sandusky.		Pur. Agent, J. W. Beggs.					
Secretary, J. W. Beggs.		Prod. Man., J. W. Beggs.					
Sales Man., E. R. Sandusky.							
<b>Bell Motor Car Co., York, Pa.</b>				<b>Carroll Automobile Co., Lorain, O.</b>			
Bell	18	5-Pas. Tour.	\$1,495	Carroll	6	Touring	\$3,985
					6	Roadster	3,985
<b>Biddle Motor Car Co., Philadelphia, Pa.</b>				President, Charles Carroll.		Vice Pres., C. W. Brainard.	
Biddle		Touring Car	\$2,985	Treas., A. E. Cameron.		Vice Pres., F. M. Stephenson.	
				Secretary, H. E. Bracker		Pur. Agent, J. W. Butler.	

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Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
<b>Detroit Electric Car Co., Detroit, Mich.</b>							
Detroit Electric	88	Brougham	\$4,000		T	Run. with Starter	465
President, W. C. Anderson.		Secretary, James D. Wilson.			T	Touring	440
Vice Pres., A. C. Downing.		Sales Man., A. C. Downing.			T	Tour. with Starter	510
Vice Pres., George M. Bacon.		Pur. Agent, C. L. Crawford.			T	Coupe	745
Treasurer, F. P. Price.		Chief Eng., George M. Bacon.			T	Chassis	360
<b>Disbrow Motor Co., Cleveland, O.</b>				President, Edsel B. Ford.			
Disbrow	A		\$2,950	Vice Pres., F. L. Klingensmith.			
<b>Dispatch Motor Car Co., Minneapolis, Minn.</b>				Treasurer, F. L. Klingensmith.			
<b>Doble-Detroit Steam Motors Co., Detroit, Mich.</b>				Secretary, B. J. Craig.			
Doble-Detroit			\$5,000	<b>H. H. Franklin Manufacturing Co., Syracuse, N. Y.</b>			
<b>Dodge Brothers, Detroit, Mich.</b>				Franklin	9-B	Touring	\$2,600
Dodge		Touring	\$1,285		9-B	Tour. car with Per. Top	2,950
		Roadster	1,235		9-B	2-Pas. Runabout	2,400
		Sedan	2,150		9-B	2-Pas. Run. with Per. Top	2,750
		Coupe	1,900		9-B	4-Pas. Roadster	2,500
Gen. Man., F. J. Haynes.		As. G. Man., A. T. Waterfall.			9-B	Brougham	3,500
As. Secretary, H. V. Popeny.		Pur. Agent, R. H. Allen.			9-B	Sedan	3,600
Act. G. S. Man., C. W. Matheson.		Prod. Man., A. Z. Mitchell.			9-B	Chassis	2,225
Ad. Man., G. H. Phelps.		Chief Eng., Russell Huff.		President, H. H. Franklin.		Sales Man., S. E. Ackerman.	
Export Man., H. M. Robins.				Vice Pres., John Wilkinson.		Pur. Agent, J. E. Walker.	
<b>Dorris Motor Car Co., St. Louis, Mo.</b>				Treasurer, F. A. Barton.		Ad. Man., H. H. Goodhart.	
Dorris	6-80	7-Pas. Touring	\$4,785	As. Treas., C. E. Hull.		Prod. Man., William Dunk.	
		4-Pas. Tourist	4,785	Secretary, F. A. Barton.		Service Man., Paul Williams.	
		4-Pas. Coupe	5,800	Comptroller, R. T. Wennstroen.		Chief Eng., L. M. Stellman.	
		7-Pas. Sedan	6,690	<b>Fritchle Electric Co., Denver, Col.</b>			
President, G. P. Dorris.		Gen. Man., Webster Coleburn.		Fritchle Electric		5-Pas. Coupe	
Vice Pres., I. C. Mackermann.		Sales Man., J. T. Rumble.		<b>Friend Motors Corporation, Pontiac, Mich.</b>			
Vice Pres., Webster Coleburn.		Pur. Agent, J. C. MacCarthy.		Friend	4	5-Pas. Touring	\$1,585
Treasurer, J. F. Culver.		Prod. Man., A. B. Horton.			4	3-Pas. Roadster	1,585
Secretary, C. F. Culver.		Export Rep., George H. Smith.			4	Coupe	2,485
<b>Dort Motor Car Co., Flint, Mich.</b>					4	Sedan	2,585
Dort	15	5-Pas. Touring	\$1,085	President, Otis C. Friend.		Sales Man., F. W. Pilton.	
		Roadster	\$1,085	Vice Pres., Robert Dally.		Pur. Agent, J. H. Harper.	
		Sedan	\$1,765	Treasurer, Robert Dally.		Prod. Man., C. J. Jackson.	
		Coupe	1,765	Secretary, Robert Dally.		Chief Eng., William Mertins.	
President, J. D. Dort.		Gen. S. Man., John D. Mansfield.		<b>Frontenac Motor Co., Indianapolis, Ind.</b>			
Vice Pres., D. M. Averill.		Ad. Man., H. C. Daniels.		Frontenac		Racing	
Treasurer, F. A. Aldrich.		Pur. Agent, Dan A. Greene.		<b>Gardner Motor Co., St. Louis, Mo.</b>			
Secretary, F. A. Aldrich.		Prod. Man., L. M. Taylor.		Gardner	G	Touring	\$1,195
Gen. Man., D. M. Averill.		Export Man., E. J. Foxson.			G	Roadster	1,195
<b>Duesenberg Motors Corporation, Indianapolis, Ind.</b>					G	Sedan	2,145
Duesenberg		Touring		President, Russell E. Gardner.		Sales Man., Rus. E. Gardner, Jr.	
<b>Du Pont Motors, Inc., Wilmington, Del.</b>				Vice Pres., Fred W. Gardner.		Ad. Man., W. H. Yeldell.	
Du Pont	A	Roadster	\$3,400	Vice Pres., Rus. E. Gardner, Jr.		Pur. Agent, Chas. Kreichelt.	
	A	Touring	3,400	Treasurer, E. H. Behrle.		Prod. Man., Fred W. Gardner.	
	A	Sedan	4,900	Secretary, L. A. Moore.		Exp. Man., Rus. E. Gardner, Jr.	
President, E. Paul Du Pont.		Ad. Man., Parke Ross.		<b>Gearless Steel Auto Manufacturing Co., Denver, Col.</b>			
Vice Pres., A. M. Maris.		Pur. Agent, Wm. B. Walker, Jr.		Super-Steamer			\$3,000
Treasurer, Parke Ross.		Works Man., C. J. Marks.		<b>Geneva Wagon Co., Geneva, N. Y.</b>			
Secretary, Charles V. Bishop.		Export Man., Parke Ross.		Geneva		Touring	\$2,300
Sales Man., Parke Ross.				<b>Geronimo Motor Car Co., Enid, Okla.</b>			
<b>Elgin Motor Car Co., Argo, Ill.</b>				Geronimo		Touring	\$1,995
Elgin	K	Touring	\$1,775	<b>Globe Motors Co., Cleveland, O.</b>			
	K	4-Pas. Scout	1,895	Globe Four		Touring	
	K	Sedan	2,685	President, Charles H. Davis.		Secretary, F. W. Staffield.	
	K	Coupe	2,685	Treasurer, L. E. Holmden.		Chief Eng., R. E. McLain.	
President, C. S. Rieman.		Ad. Man., A. L. Chambers.		<b>Grant Motor Car Corporation, Cleveland, O.</b>			
Vice Pres., J. P. O'Shaughnessy.		Pur. Agent, L. T. Miller.		Grant	H	Touring	\$1,550
Vice Pres., J. M. Snitzler.		Prod. Man., J. G. Anderson.			H	Roadster	1,550
Treasurer, W. G. Knoedler.		As. Gen. Man., C. F. Jamison.			H	Sedan	2,450
Secretary, W. G. Knoedler.		Export Man., F. O. Whiting.			H	Coupe	2,450
As. Sales Man., L. F. Johnston.				President, B. A. Shaw.		Ad. Man., C. C. Campbell.	
<b>Elkhart Carriage &amp; Motor Car Co., Elkhart, Ind.</b>				Vice Pres., G. C. Hubbs.		Pur. Agt., G. C. Starkweather.	
Elcar	D-4	Touring	\$1,495	Treasurer, F. S. Denneen.		Prod. Man., F. S. Denneen.	
	H-4	Sportster	1,495	Secretary, Mr. Green.		Chief Engineer, J. M. Howe.	
	K-4	Coupe	2,095	Sales Man., Frank S. Stratton.		Prod. Engineer, W. G. Stewart.	
	G-4	Sedan	2,195	<b>Halladay Motor Car Co., Newark, O.</b>			
	D-6	Touring	1,795	Halladay	Manhattan Sp.	5-Pas. Touring Car.	\$2,285
	H-6	Sportster	1,795		Mayflower	Sedan	2,950
	K-6	Coupe	2,395	President, Thomas E. Huth.		Sales Man., G. L. Huth.	
	G-6	Sedan	2,495	Vice Pres., H. Boyd.		Ad. Man., G. L. Huth.	
President, W. B. Pratt.		Sales Man., G. B. Pratt.		Treasurer, Ed. Hulskeizer.		Pur. Agent, B. H. Buxton.	
Vice Pres., W. H. Patterson.		Ad. Man., U. G. Manning.		Secretary, Ed. Hulskeizer.		Prod. Man., E. Settles.	
Vice Pres., U. G. Manning.		Pur. Agent, F. L. Shroiner.		<b>Hamlin-Holmes Motor Co., Chicago, Ill.</b>			
Treasurer, J. A. Bell.		Prod. Man., A. G. Phelps.		Hamlin-Holmes	A	Touring	
Secretary, G. B. Pratt.		Export Man., G. B. Pratt.		<b>Handley-Knight Co., Kalamazoo, Mich.</b>			
<b>Erie Motor Co., Painesville, O.</b>				Handley-Knight	A	Touring	\$2,935
Erie		Touring	\$550		A	Sedan	
<b>Essex Motors, Inc., Detroit, Mich.</b>				President, J. I. Handley.		As. to Pres., J. Tallmadge.	
Essex	A	5-Pas. Touring	\$1,595	Vice Pres., Charles S. Campbell.		As. to Pres., D. B. Williams.	
		2-Pas. Roadster	1,595	Vice Pres., W. E. Upjohn.		Pur. Agent, H. L. Dunn.	
		5-Pas. Sedan	2,450	Treasurer, W. L. Otis.		Chief Eng., R. A. De Vlieg.	
		2-Pas. Cabriolet	2,100	Secretary, F. L. Mower.			
<b>Ford Motor Co., Highland Park, Mich.</b>				<b>Hanson Motor Co., Atlanta, Ga.</b>			
Ford	T	Runabout	\$395	Hanson	54	Touring	\$2,365
						Roadster	2,365

Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
President, George W. Hanson.		Sport	2,465	Treasurer, C. L. V. Eselsen.		Prod. Man., C. S. Halliday.	
Vice Pres., J. A. Sasser.		Sedan	2,885	Secretary, C. L. V. Eselsen.		Export Man., T. C. Foster.	
Treasurer, W. H. Scott.		Sales Man., O. R. Randall.		Sales Man., W. W. Sterling.			
Secretary, W. H. Scott.		Ad. Man., O. R. Randall.					
		Pur. Agent, W. H. Scott.					
		Export Man., O. R. Randall.					
<b>Hare's Motors, Inc., New York City, N. Y.</b>				<b>Jones Motor Car Co., Wichita, Kan.</b>			
Locomobile	48	7-Pas. Touring	\$7,550	Jones	6-28	7-Pas. Touring	\$2,750
		4-Pas. Touring	7,650			5-Pas. Touring	2,750
		Limousine	9,150			Victoria	2,850
		Landulet	9,150			4-Pas. Speedster	2,750
		Chassis	6,500			2-Pas. Oil Field Special	2,400
Mercer	Ser. 5	Touring	3,950			2 Pas. Roadster	2,750
		Sportabout	3,950	<b>Jordan Motor Car Co., Cleveland, O.</b>			
		Runabout	3,950	Jordan		7-Pas. Silhouette	\$2,875
		Raceabout	3,675			5-Pas. Silhouette	2,650
		Coupe	5,150			Playboy	2,650
		Limousine	5,650			7-Pas. Enclosed Special	3,325
President, Emlen S. Hare.		Secretary, F. R. Hickman.				5-Pas. Enclosed Special	3,150
Vice Pres., H. D. Church.		Sales Man., B. C. Helm.				Playboy Enclosed Special	3,150
Vice Pres., O. E. Hunt.		Ad. Man., C. B. Morse.				Silhouette Brougham	3,700
Vice Pres., Henry Lansdale.		Pur. Agent, L. M. Ketzle.		President, Edward S. Jordan.		Secretary, Paul Zens.	
Vice Pres., A. L. Riker.		Prod. Man., L. C. Cram.		Treasurer, Otto Miller.		Sales Man., W. D. Riley.	
Treasurer, F. R. Hickman.		Export Man., E. J. Ross, Jr.					
<b>Harroun Motors Corporation, Wayne, Mich.</b>				<b>Kentucky Wagon Manufacturing Co., Louisville, Ky.</b>			
Harroun	A A 2	Touring Car	\$1,195	Dixie Flyer	H S 70	Touring	\$1,595
<b>Harvard Motor Car Co., Washington, D. C.</b>					H S 70	Roadster	1,595
Harvard	4-20	Touring	\$850		H S 70	Sedan	2,570
<b>Haynes Automobile Co., Kokomo, Ind.</b>					H S 70	Coupe	2,570
Haynes	47	Touring	\$2,935	President, Robert V. Board.		Pur. Agent, C. C. Young.	
	47	Tourister	2,935	Vice Pres., S. K. Miller.		Prod. Man., C. V. Franks.	
	47	Speedster	3,500	Treasurer, D. Raibourn.		Pur. Agent, C. C. Young.	
	47	Brougham	3,950	Secretary, Philip Tuley.		Prod. Man., W. J. Coleburn.	
	47	Sedan	4,250	Sales Man., S. K. Miller.		Export Man., E. Palmer.	
	47	Suburban	4,250	Ad. Man., C. V. Franks.		Chief Eng., J. F. Murphy.	
President, Elwood Haynes.		Sales Man., S. M. How.		<b>Kenworthy Motors Corporation, Mishawaka, Ind.</b>			
Vice Pres., A. G. Seiberling.		Ad. Man., G. V. Radoye.		Kenworthy	6-55	4-Pas. Touring	\$3,785
Treasurer, A. E. Starbuck.		Prod. Man., Charles Crick.			6-55	7-Pas. Touring	3,985
Secretary, A. E. Starbuck.		Pur. Agent, W. G. Kibler.			4-80	4-Pas. Touring	4,535
Gen. Man., A. G. Seiberling.		Export Man., E. W. Headington.			4-80	7-Pas. Touring	4,785
<b>H. C. S. Motor Car Co., Indianapolis, Ind.</b>				President, C. Y. Kenworthy.		Sales Man., C. Y. Kenworthy.	
H. C. S.		4-Pas. Touring	\$2,975	Vice Pres., F. E. Frain.		Pur. Agent, F. J. Schaefer.	
		Roadster	2,925	Treasurer, A. E. Hill.		Prod. Man., Kurt Hitke.	
				Secretary, A. E. Hill.		Chief Eng., Kurt Hitke.	
<b>Holmes Automobile Co., Canton, O.</b>				<b>King Motor Car Co., Detroit, Mich.</b>			
Holmes	4	7-Pas. Touring	\$3,350	King	H	Touring	\$2,725
	4	4-Pas. Roadster	3,350		H	Foursome	2,725
	4	7-Pas. Sedan	4,550		H	Road King	2,740
	4	Coupe	4,250		H	Limoudan	4,035
President, Arthur Holmes.		Sales Man., C. H. Rockwell.		Vice Pres., W. B. Nesbit.		Pur. Agent., J. R. Emmerson.	
Vice Pres., C. H. Rockwell.		Ad. Man., Mr. Bryant.		Treasurer, A. D. McCollough.		Prod. Man., R. G. Hendricks.	
Treasurer, George W. Belven.		Pur. Agent, J. E. Hade.		Sales Man., E. A. Scheu.		Export Man., W. R. Vogeler.	
Secretary, George W. Belven.		Prod. Man., D. F. Morse.		Ad. Man., Bob Walsh.			
Gen. Man., F. H. Golding.		Chief Draftsman, H. H. Boyer.		<b>Kissel Motor Car Co., Hartford, Wis.</b>			
<b>Hudson Motor Car Co., Detroit, Mich.</b>				Kissel Kar	Custom Built	4-Pas. Tourister	\$3,475
Hudson Super-Six	12-0	7-Pas. Phaeton	\$2,400		Custom Built	2-Pas. Speedster	3,475
		4-Pas. Phaeton	2,400		Custom Built	Touring	3,475
		Cabriolet	3,000		Custom Built	Coupe	4,275
		Coupe	3,275		Custom Built	Sedan	4,275
		Sedan	3,400		Custom Built	Urban Sedan	4,650
		Touring Limousine	3,625		Custom Built	Limousine	4,650
		Limousine	4,200	President, D. A. Kissel.		Ad. Man., Ralph Kaye.	
President, R. D. Chapin.		Ad. Man., G. W. Cushing.		Treasurer, W. L. Kissel.		Pur. Agent, A. K. Menzel.	
Vice Pres., Howard E. Coffin.		Pur. Agent, A. Barit.		Secretary, W. L. Kissel.			
Treasurer, R. B. Jackson.		Prod. Man., Joseph Whittaker.		<b>Kline Motor Car Corporation, Richmond, Va.</b>			
Secretary, W. J. McAneeny.		Export Man., H. B. Phipps.		Kline Kar	6-55-K	Sport	\$2,290
Sales Man., O. H. McCornack.					6-55-K	Auxiliary	2,290
<b>Huffman Bros. Motor Co., Elkhart, Ind.</b>					6-55-K	Roadster	2,290
Huffman		Touring	\$1,995		6-55-K	Sedan	3,290
<b>Hupp Motor Car Corporation, Detroit, Mich.</b>						Coupe	3,250
Hupmobile	R	Touring	\$1,685	President, Warner Moore.		Ad. Man., J. A. Kline.	
	R	Roadster	1,685	Vice Pres., J. A. Kline.		Pur. Agent, C. E. Rahauer.	
	R	Sedan	2,800	Treasurer, W. H. Warren.		Prod. Man., J. P. Arbolt.	
	R	Coupe	2,725	Secretary, W. H. Warren.		Export Man., L. R. Travers.	
President, Charles B. Hastings.		Gen. S. Man., O. C. Hutchinson.		Sales Man., L. R. Travers.			
V. Pres., Arthur Von Schlegell.		Pur. Agent, Roy Taylor.		<b>La Fayette Motors Co., Indianapolis, Ind.</b>			
Vice Pres. Dubois Young.		Ad. Man., Frederick Dickinson.		La Fayette	134	Touring	\$5,625
Chairman, J. Walter Brake.		Prod. Man., Dubois Young.				Torpedo	5,625
Treas., Arthur Von Schlegell.		Supt., H. N. Nickerson.				Four-Door Coupe	7,200
As. Treas., Ralph Lyons.		Exp. Man., J. Howard Teagan.				Sedan	7,400
Sec., Arthur Von Schlegell.						Limousine	7,500
						Chassis	4,750
<b>Jackson Motors Corporation, Jackson, Mich.</b>				President, Charles W. Nash.		Sales Man., E. C. Howard.	
Jackson	6-38	5-Pas. Semi-Sport	\$2,550	Vice Pres., D. McCall White.		Ad. Man., Leo N. Burnett.	
		4-Pas. Broadway Special	2,885	Vice Pres., E. C. Howard.		Pur. Agent, R. S. Hoot.	
		5-Pas. California Special	2,985	Treasurer, M. J. Moore.		Prod. Man., A. C. Auten.	
		4-Pas. Princess Coupe	3,960	Secretary, M. J. Moore.		Chief Engineer, J. W. Applin.	
		5-Pas. Hollywood	3,960	<b>La Marne Motor Car Co., Cleveland, O.</b>			
President, H. A. Matthews.		Ad. Man., Guy C. Core.		La Marne		Touring	\$1,485
Vice Pres., W. W. Sterling.		Pur. Agent, Pat. Jors.		<b>Laurel Motor Corporation, Anderson, Ind.</b>			
				Laurel	35	Touring	\$595



Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
<b>Leach Biltwell Motor Co., Los Angeles, Cal.</b>				<b>Mercury Motor Car Co., Chicago, Ill.</b>			
Leach	20-A	5-Pas. Touring	\$5,200		Roadster		995
	20-B	7-Pas. Touring	5,700		Coupe		1,595
	20-C	3-Pas. Roadster	5,700		Sedan		1,595
President, M. A. Leach.		Pur. Agent, F. P. Richardson.			Cowl & Chassis		915
Secretary, J. H. Faircloth.		Prod. Man., R. A. Wilson.		President, W. L. Mitchell.		Ad. Man., W. J. Mattimore.	
Sales Man., R. P. Pennock.				Treasurer, W. M. Anthony.		Pur. Agent, R. M. Hood.	
				Secretary, L. W. Lineaweaver.		Prod. Man., C. Adams.	
				Sales Man., A. E. Barker.		Ex. Man., H. W. Russell.	
<b>Lexington Motors Co., Connersville, Ind.</b>				<b>Meteor Motor Sales Co., Piqua, O.</b>			
Lexington	Series T	Touring	\$2,935		R	Touring	\$5,500
	Series T	Sedanette	4,150				
	Series T	Salon Sedan	4,250				
	Series S	Thorobred	2,285				
	Series S	Touring Car	2,285				
	Series S	Tex-Sedan	2,785				
	Series S	Coupe	3,250				
	Series S	Sedan	3,350				
President, Frank B. Ansted.		Ad. Man., Emery Huston.					
Vice Pres., F. I. Barrows.		Pur. Agent, J. F. Davenport.					
Vice Pres., Emery Huston.		Prod. Man., L. A. Henson.					
Treasurer, L. A. Hanson.		Export Man., J. T. McKinney.					
Secretary, L. A. Hanson.		Chief Engineer, J. C. Moore.					
Sales Man., J. Dewey.							
<b>Lewis Spring and Axle Co., Chelsea, Mich.</b>				<b>Metz Sales Corporation, Boston, Mass.</b>			
Hollier Six	206 B	Touring	\$1,985	Metz Master Six	Roadster		\$1,995
					Touring		1,995
					Coupe		2,795
					Sedan		2,835
				President, C. H. Metz.		Secretary, E. H. Metz.	
				Treasurer, R. A. Pickens.			
<b>Liberty Motor Car Co., Detroit, Mich.</b>				<b>Milburn Electric 27 L</b>			
Liberty	10-C	5-Pas. Touring	\$1,795		Brougham		\$2,685
	10-C	2-Pas. Roadster	1,795				
	10-C	4-Pas. Speedster	1,885				
	10-C	Sedan	2,850				
	10-C	Coupe	2,825				
President, Percy Owen.		Sales Man., Cliff Knoble.					
Treasurer, D. E. Williams.		Ad. Man., Verne E. Burnett.					
Secretary, D. E. Williams.		Pur. Agent, J. R. Collins.					
As. Gen. Man., J. E. Fields.		Chief Engineer, G. B. Allen.					
<b>Lone Star Motor Truck &amp; Tractor Assn., San Antonio, Tex.</b>				<b>Milburn Wagon Co., Toledo, O.</b>			
Lone Star	B-T-4-30	Touring	\$1,595				
	T-4-30	Touring	1,395				
	B-R-4-30	Roadster	1,595				
President, H. C. Feldman.		Ad. Man., J. W. Oswald.					
Vice Pres., Leo M. J. Dielmann.		Pur. Agent, A. D. Shaw.					
Treasurer, H. C. Heilig.		Prod. Man., A. D. Shaw.					
Secretary, Leo M. J. Dielmann.		Export Man., J. W. Oswald.					
Sales Man., J. W. Oswald.		Chief Engineer, J. W. Oswald.					
<b>Lorraine Motors Corporation, Grand Rapids, Mich.</b>				<b>Moline Plow Co., Stephens Motor Works, Freeport, Ill.</b>			
Lorraine		Touring	\$1,425	Stephens	82	Roadster	\$2,400
					84	4-Pas. Touring	2,400
					86	6-Pas. Touring	2,400
					88	Sedan	3,100
				President, G. N. Peek.		Ad. Man., How. W. Harrington.	
				Treasurer, H. S. Lord.		Pur. Agent, O. T. Lawson.	
				Gen. Man., H. J. Leonard.		Prod. Man., Charles E. McCool.	
				As. G. Man., C. Roy Clough.		Export Man., H. S. Evans.	
				Sales Man., F. T. Larson.			
<b>Louisiana Motor Car Co., Shreveport, Ind.</b>				<b>Monitor Motor Car Co., Columbus, O.</b>			
Bour-Davis	21-S	Touring	\$2,585	Monitor	Series 3 B-50	5-Pas. Touring	\$2,475
President, W. F. French.		Sales Man., J. E. French.			B-51	Roadster	2,475
Vice Pres., H. B. Hern.		Pur. Agent, F. G. Ross.			B-52	Sedan	3,475
Treas., Paul W. Southerland.		Prod. Man., William Ross.		President, Charles C. Cummins.		Secretary, F. S. Cummins.	
Sec., Paul W. Southerland.				Treas., F. S. Cummins.		Sales Man., H. S. Warwick.	
				Vice Pres., H. P. Jeffers.		Pur. Agent, Chas. C. Cummins.	
				Vice Pres., H. S. Warwick.		Prod. Man., J. F. Knecht.	
<b>McFarlan Motor Corporation, Connersville, Ind.</b>				<b>Monroe Motors Corporation, Indianapolis, Ind.</b>			
McFarlan	142	2-Pas. Roadster	\$6,300	Monroe	S-9	Touring	\$1,440
	145	Sport	6,500		S-10	Roadster	1,440
	147	Touring	6,300			Sedan	2,500
	151	Town Car	7,500			Coupe	2,400
	153	Coupe	7,500	President, William Small.		Ad. Man., George Seibert.	
	154	Knickerbocker Cabriolet	9,090	Vice Pres., R. O. Mallot.		Pur. Agent, A. Goossen.	
	155	Sport Sedan	7,500	Treasurer, W. G. Todd.		Prod. Man., H. C. Dunning.	
	156	Touring Sedan	7,500	Secretary, W. G. Todd.		Chief Eng., Louis Chevrolet.	
	157	Suburban Sedan	7,500	Sales Man., George Seibert.			
	158	Limousine	7,500				
	161	Continental Landulet	8,000				
President, A. H. McFarlan.		Ad. Man., B. M. Barrows.					
Vice Pres., B. M. Barrows.		Pur. Agent, R. F. Oliger.					
Treasurer, B. M. Barrows.		Prod. Man., P. G. Norris.					
Secretary, E. W. Cotton.		Export Man., P. T. Barrows.					
Sales Man., B. M. Barrows.							
<b>Maibohm Motors Co., Sandusky, O.</b>				<b>Moon Motor Car Co., St. Louis, Mo.</b>			
Maibohm	B	Phaeton	\$1,575	Moon	6-48	Touring	\$1,985
	B	Roadster	1,575		6-48	Roadster	2,085
	B	Sedan	2,395		6-48	Sedan	2,995
	B	Coupe	2,395		6-48	Coupe	2,985
	B	Sport	On Application		6-68	Touring	2,485
President, H. C. Maibohm.		Ad. Man., T. W. Cushing.			6-68	Sedan	3,485
Vice Pres., T. W. Cushing.		Pur. Agent, W. J. Corr.			6-42	Touring	1,585
Vice Pres., W. C. Maibohm.		Prod. Man., W. C. Maibohm.		President, Stewart McDonald.		Ad. Man., N. E. McDarby.	
Treasurer, I. O. Bormann.		Export Man., C. J. Jerosch.		Vice Pres., E. J. Moon.		Pur. Agent, G. F. Helsing.	
Secretary, I. O. Bormann.		Chief Eng., H. H. Holton.		Treasurer, A. F. Moberly.		Prod. Man., J. T. Gardner.	
Sales Man., L. G. Parkhurst.				Secretary, G. H. Shelp.		Export Man., E. H. Serrano.	
				Sales Man., F. H. Rengers.		Engineer, G. H. Kublin.	
<b>Marshall Manufacturing Co., Chicago, Ill.</b>				<b>Moore Motor Vehicle Co., Danville, Ill.</b>			
Marshall		Touring	\$1,275	Moore	F-30	Touring	\$1,095
<b>Martin-Wasp Corporation, Bennington, Vt.</b>				<b>Murray Motor Car Co., Newark, N. J.</b>			
Martin-Wasp	2011		\$6,500	Murray	30-F	Touring	\$2,800
President, Karl Martin.		Treasurer, Richards Kellog.					
Vice Pres., Robert Healy.		Secretary, Richards Kellog.					
Pur. Agent, Karl Martin.		Chief Eng., Karl Martin.					
<b>Maxwell Motor Co., Detroit, Mich.</b>				<b>Mutual Motors Co., North Tonawanda, N. Y.</b>			
Maxwell		Touring	\$995	Marion-Handley B		Touring	\$1,850
<b>Nash Motors Co., Kenosha, Wis.</b>				<b>Nash Motors Co., Kenosha, Wis.</b>			
	681	5-Pas. Touring	\$1,695	Nash	681	5-Pas. Touring	\$1,695
	682	7-Pas. Touring	1,875		682	7-Pas. Touring	1,875
	684	7-Pas. Sedan	2,895		684	7-Pas. Sedan	2,895
	685	4-Pas. Coupe	2,650		685	4-Pas. Coupe	2,650
	686	2-Pas. Roadster	1,695		686	2-Pas. Roadster	1,695
	687	4-Pas. Sport	1,850		687	4-Pas. Sport	1,850
President, Charles W. Nash.		Sales Man., Charles B. Voorhis.		President, Charles W. Nash.		Sales Man., Charles B. Voorhis.	
Vice Pres., Robert Herrick.		Ad. Man., Ellis J. Travers.		Vice Pres., Robert Herrick.		Ad. Man., Ellis J. Travers.	

Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
Vice Pres., Charles B. Voorhis.	Pur. Agent, Harold E. Long.			Single-Six	Roadster		3,640
Vice Pres., James T. Wilson.	Prod. Man., Robert E. Elliott.			Single-Six	Sedan		4,950
Treasurer, George H. Eddy.	Export Man., John R. Rose.			Single-Six	Coupe		4,835
Secretary, Horace J. Mellum.	Chief Eng., Eric Wallberg.			President, Alvan Macauley.	Sales Man., R. E. Chamberlain.		
<b>National Motor Car &amp; Vehicle Corporation, Indianapolis, Ind.</b>				Vice Pres., E. F. Roberts.	Ad. Man., W. H. Holmes.		
National	Sixtet	Touring	\$3,750	Vice Pres., J. G. Vincent.	Pur. Agent, F. W. Boynton.		
	Sixtet	Phaeton	3,750	Vice Pres., H. H. Hills.	Prod. Man., R. O. Gill.		
	Sixtet	Roadster	3,750	Treasurer, F. S. Jandron.	Export Man., Fred H. Cardway.		
	Sixtet	Coupe	4,900	Secretary, F. R. Robinson.			
	Sixtet	Sedan	4,950	<b>Paige-Detroit Motor Car Co., Detroit, Mich.</b>			
President, George M. Dickson.	Ad. Man., Frederick Wellman.			Paige	6-42 Light Six	5-Pas. Touring	\$1,770
Vice Pres., O. J. Thomen.	Pur. Agent, Thomas J. Moore.				6-42 Light Six	4-Pas. Sport	1,999
Vice Pres., Col. Wm. Guy Wall.	Prod. Man., Otto Moller.				6-42 Light Six	Roadster	1,770
Treasurer, M. E. Elstin.	Export Man., H. R. Averill.				6-42 Light Six	Coupe	2,525
Secretary, M. E. Elstin.	Chief Eng., Col. Wm. Guy Wall.				6-42 Light Six	Sedan	2,645
Sales Man., James M. Clarke.					6-66	7-Pas. Touring	2,795
<b>E. A. Nelson Automobile Co., Detroit, Mich.</b>					6-66	4-Pas. Sport	2,895
Nelson	E	Touring	\$1,700		6-66	Coupe	3,675
President, J. M. Hibbard.	Ad. Man., C. H. Dunlap.				6-66	Sedan	3,750
Treasurer, Chas. F. Dalbridge.	Pur. Agent, Fred P. Harvey.			President, Harry M. Jewett.	Ad. Man., H. C. Dart.		
Secretary, Fred P. Harvey.	Export Man., C. H. Dunlap.			Vice Pres., Frederick L. Jewett.	Gen. Man., Frederick L. Jewett.		
Sales Man., C. H. Dunlap.				Treasurer, Gilbert W. Lee.	Pur. Agent, T. Bradley.		
<b>Noma Motor Corporation, New York, N. Y.</b>				Secretary, William B. Cady.	Prod. Man., W. A. Wheeler.		
Noma		Tourson	\$3,200	Sales Man., Henry Krohn.			
		Roadster	3,000	<b>Pan-American Motors Corporation, Decatur, Ill.</b>			
<b>Nordyke &amp; Marmon Co., Indianapolis, Ind.</b>				Pan-American	E-6-65	5-Pas. Touring	\$2,450
Marmon	34	Speedster	\$5,300		F-6-55	2-Pas. Roadster	2,450
		Roadster	5,000		G-6-55	7-Pas. Sedan	3,600
		4-Pas. Touring	5,000		E-6-55	Artcraft	3,000
		7-Pas. Touring	5,000	President, Edward Danner.	Pur. Agent, Fred Peebles.		
		Coupe	6,150	Vice Pres., J. A. Clayton.	Prod. Man., John Herron.		
		Sedan	6,600	Treasurer, W. A. Phares.	Export Man., W. P. Arthur.		
		Limousine	6,800	<b>Parenti Motors Corporation, Buffalo, N. Y.</b>			
		Town Car	6,800	Parenti	H 1921	5-Pas. Touring	\$2,000
President, W. C. Marmon.	Sales Man., H. H. Rice.				S	Sedan	3,000
Vice Pres., F. E. Moskovics.	Ad. Man., A. J. Rogers.			President, J. S. Parenti.	Ad. Man., W. C. Wheeler.		
Vice Pres., H. C. Marmon.	Pur. Agent, A. B. Wagner.			Vice Pres., D. R. Parenti.	Pur. Agent, H. C. Gortzig.		
Treasurer, A. R. Helskell.	Prod. Man., R. B. Little.			Treasurer, F. W. Krofft.	Chief Engineer, H. S. Vawter.		
Secretary, H. G. Shafer.	Export Man., H. A. Raseley.			Sales Man., W. C. Wheeler.			
<b>Norwalk Motor Car Co., Martinsburg, W. Va.</b>				<b>W. A. Paterson Co., Flint, Mich.</b>			
Norwalk	4-30 K-S	5-Pas. Touring	\$1,285	Paterson	6-50	7-Pas. Touring	\$1,925
President, C. B. Skadden.	Sales Man., W. W. Gawthrop.				6-50	5-Pas. Touring	1,895
Treasurer, L. E. Ernst.	Pur. Agent, M. M. Yontz.				6-50	Sedan	2,895
Secretary, L. E. Ernst.	Prod. Man., H. B. Boyer.				6-50	Coupe	2,895
<b>Oakland Motor Car Co., Pontiac, Mich.</b>					6-50	Touring, Artcraft Top	2,500
Oakland	34 C	Roadster	\$1,395	President, W. A. Paterson.		Secretary, W. S. Paterson.	
	34 C	5-Pas. Open	1,395	Treasurer, W. R. Hubbard.			
	34 C	Coupe	2,065	<b>Peerless Motor Car Co., Cleveland, O.</b>			
	34 C	Sedan	2,065	Peerless	56	Touring	\$3,230
President, Fred W. Warner.	Prod. Man., W. D. Kelly.				56	Roadster	3,200
Sales Man., C. J. Nephler.	Treasurer, M. L. Prenskey.				56	Coupe	3,920
As. Gen. Man., W. H. Masten.	Secretary, D. S. Merrill.				56	Sedan	4,140
Pur. Agent, J. S. O'Rourke.					56	Sedan-Limousine	4,400
<b>Ohio Motor Vehicle Co., Cleveland, O.</b>				President, Lewis H. Kittredge.	Sales Man., R. J. Schumm.		
Ferris	C 20	Touring	\$3,350	Vice Pres., T. W. French.	Ad. Man., C. S. Bailey.		
	C 20	4-Passenger	3,350	Vice Pres., W. H. Staring.	Pur. Agent, R. T. Scott.		
	C 20	2-Passenger	3,350	Treasurer, E. H. Cavert.	Prod. Man., W. H. Staring.		
	C 20	Sedan	4,875	Secretary, E. H. Cavert.			
President, Charles A. Riegler.	Sales Man., C. Floyd Greene.			<b>Peters Motors Corporation, Trenton, N. J.</b>			
Treasurer, J. M. Black.	Ad. Man., C. Floyd Greene.			Everybody's Car			
Secretary, W. E. Ferris.	Prod. Man., J. D. Wiggins.			<b>Phlanna Motors Co., Newark, N. J.</b>			
<b>Olds Motor Works, Lansing, Mich.</b>				Phlanna	Touring		\$6,000
Oldsmobile	6	Touring	\$1,450		Limousine		11,500
	6	Roadster	1,450		Closed		11,500
	6	Sedan	2,145	<b>Piedmont Motor Car Co., Lynchburg, Va.</b>			
	6	Coupe	2,145	Piedmont	4-30	Touring	\$1,485
	8	Touring	2,100		6-40	Touring	1,945
	8	Sport	2,100	President, W. A. Taylor.	Ad. Man., Paul Moore.		
	8	Sedan	3,300	Vice Pres., Fred Harper.	Pur. Agent, George L. Hay.		
President, Ed. Ver Luiden.	Sales Pro. Man., T. O'Brien.			Treasurer, A. L. Stephens.	Prod. Man., H. W. Kriner.		
Vice Pres., Leon German.	Pur. Agent, Loyd Maxson.			Secretary, A. L. Stephens.	Export Man., H. W. Kriner.		
Treasurer, Leon German.	Prod. Man., Jack Lilly.			Sales Man., Paul Moore.			
Sales Man., Charles A. Tucker.				<b>Pierce-Arrow Motor Car Co., Buffalo, N. Y.</b>			
<b>Olympian Motors Co., Pontiac, Mich.</b>				Pierce-Arrow	38 H. P.	Touring	\$7,500
Olympian		Touring	\$1,585		38 H. P.	3-Pas. Runabout	7,500
<b>Owen Magnetic Motor Car Co., Wilkes-Barre, Pa.</b>					38 H. P.	4-Pas. Roadster	7,500
Owen Magnetic		7-Pas. Touring	\$7,000		38 H. P.	3-Pas. Coupe	8,500
		4-Pas. Touring	7,000		38 H. P.	Brougham, Flat Roof	8,800
		Coupe	8,000		38 H. P.	French Brougham	8,800
		Sedan	3,500		38 H. P.	Brougham Landaulet	8,800
<b>Packard Motor Car Co., Detroit, Mich.</b>					38 H. P.	Town Brougham	8,800
Packard	Twin-Six	Touring	\$6,000		38 H. P.	Vestibule Brougham	9,000
	Twin-Six	Phaeton	6,000		38 H. P.	Sedan	9,000
	Twin-Six	Runabout	6,000		38 H. P.	4-Pas. Sedan	8,800
	Twin-Six	Dup-Sedan	8,450		48 H. P.	3-Pas. Runabout	7,900
	Twin-Six	Dup-Coupe	8,250		48 H. P.	4-Pas. Touring	7,900
	Twin-Six	Limousine	8,350		48 H. P.	4-Pas. Roadster	7,900
	Single-Six	Touring	3,640		48 H. P.	5-Pas. Touring	7,900
					48 H. P.	6-Pas. Touring	8,000
					48 H. P.	7-Pas. Touring	8,000
					48 H. P.	3-Pas. Coupe	9,000

Trade Name	Model	Type	Price	Trade Name	Model	Type	Price
	48 H. P.	Brougham Flat Roof	9,300	President, W. H. Van Dervoort.	Sales Man., C. H. Van Dervoort.		
	48 H. P.	French Brougham	9,300	Vice Pres., H. A. Holder.	Ad. Man., Roy A. Sears.		
	48 H. P.	7-Pas. Suburban	9,500	Vice Pres., Rufus Walker, Jr.	Pur. Agent, G. L. Walker.		
	48 H. P.	7-Pas. French Suburban	9,500	Treasurer, Rufus Walker, Jr.	Export Man., Adam Sulima.		
	48 H. P.	Vestibule Suburban	9,700	Secretary, G. A. Shallberg.	Gen. Supt. A. Y. Miller.		
	48 H. P.	Suburban Landulet	9,500				
President, George W. Mixer.	Ad. Man., E. H. Rounds.			<b>Saxon Motor Car Corporation, Detroit, Mich.</b>			
Vice Pres., George M. Graham.	Pur. Agent, Floyd H. Smith.			Saxon	125'	Touring	\$1,895
Treasurer, M. E. Forbes.	Prod. Man., H. W. Lake				125	Sedan	2,795
Secretary, E. C. Pearson.	Export Man., W. Y. W. Rabb.				125	Coupe	2,795
Sales Man., George M. Graham.				President, C. A. Pfeffer.	Ad. Man., M. A. Hollinshead.		
				Vice Pres., H. L. Bill.	Pur. Agent, E. H. Heck.		
<b>Pilgrim Motor Car Co., Detroit, Mich.</b>				Treasurer, D. C. Bayne.	Prod. Man., Fred Wilkens.		
Pilgrim	Touring		\$895	Secretary, D. C. Bayne.	Export Man., M. S. Keller.		
				Sales Man., Carl Page.			
				<b>The Sayers &amp; Scoville Co., Cincinnati, O.</b>			
<b>Pilot Motor Car Co., Richmond, Ind.</b>				Sayers	Avondale	Touring	\$2,195
Pilot	6-45	Touring	\$1,895		Derby	Roadster	2,595
	6-45	Military Roadster	1,950		Glendale	Sedan	3,295
	6-45	Coupe	2,850	President, F. M. Sayers.	Ad. Man., C. A. Eisenhardt.		
	6-45	Sedan	2,900	Vice Pres., F. F. Scovill.	Pur. Agent, Walter Lang.		
President, George Seidel.	Ad. Man., Joseph W. Connor.			Treasurer, F. F. Scovill.	Prod. Man., Frank Nagele.		
Vice Pres., Clarence Kramer.	Pur. Agent, Frank S. Stinger.			Secretary, S. G. Schott.	Export Man., J. Fluxmon.		
Sales Man., Joseph W. Connor.	Prod. Man., A. C. Culp.			Sales Man., C. A. Eisenhardt.			
Treasurer, Theo. Hill.	Export Man., H. H. Chipman.						
Secretary, Horace Kramer.	Service Man., C. L. Wood.			<b>Scripps-Booth Corporation, Detroit, Mich.</b>			
				Scripps-Booth	B-39	Touring	\$1,545
<b>Premier Motor Corporation, Indianapolis, Ind.</b>					B-40	Roadster	1,545
Premier	C-D	7-Pas. Open	\$4,600		B-41	Sedan	2,295
	C-D	4-Pas. Open	4,600		B-42	Coupe	2,215
	C-D	2-Pas. Open	4,600	President, A. H. Sarver.	Ad. Man., J. Peterson Adams.		
	C-D	7-Pas. Closed	6,100	Vice Pres., W. H. Little.	Pur. Agent, C. G. Selden.		
	C-D	Coupe	5,600	As. Treas., Robert Dittenhaver.	Prod. Man., J. E. Burnett.		
President, L. S. Skelton.	Secretary, I. F. Schaeffer.			Secretary, H. F. Herberman.	Chief Engineer, Mark Harris.		
Vice Pres., F. P. Nehrbas.	Sales Man., E. W. Hurd.			Sales Man., L. D. Haas.			
Vice Pres., C. S. Crawford.	Pur. Agent, E. E. Westman.			<b>Seneca Motor Car Co., Fostoria, O.</b>			
Treasurer, I. F. Schaeffer.	Prod. Man., E. F. Theis.			Seneca	L	5-Pas. Touring	\$1,185
					O	2-Pas. Roadster	1,185
<b>Preston Motors Corporation, Birmingham, Ala.</b>				<b>Severin Motors Co., Kansas City, Mo.</b>			
Premocar	6-40 A	5-Pas. Touring	\$1,295	Severin	L 20	5-Pas.	\$1,185
	4-80	5-Pas. Touring	3,865			Touring	2,550
	6-40 S	5-Pas. Sedan	2,290	President, H. Severin.	Sales Man., J. Platt.		
President, Ross A. Skinner.	Ad. Man., A. B. Powell.			Vice Pres., J. Platt.	Vice Pres., J. Platt.		
Vice Pres., Joseph T. Driver.	Pur. Agent, I. L. Paisley.			Treasurer, Roy O. Maddox.	Pur. Agent, U. Severin.		
Vice Pres., O. B. Harris.	Prod. Man., J. B. Souders.						
Treasurer, Preston Orr.	Chief Eng., Ross A. Skinner.			<b>Shaw Walden W. Shaw Livery Co., Chicago, Ill.</b>			
Secretary, Preston Orr.	Export Man., Jos. T. Driver.			Shaw	Touring		\$5,500
Sales Man., Jos. T. Driver.							
<b>Rauch &amp; Lang, Inc., Chicopee Falls, Mass.</b>				<b>Sheridan Motor Car Co., Muncie, Ind.</b>			
Raulang Electric	6-55	Coach		Sheridan	B-40	Touring	
	B-46	Brougham		President, D. A. Burke.	Pur. Agent, F. J. Martin.		
President, Paul A. Frank.	Ad. Man., H. H. Doering.			Gen. Man., D. A. Burke.	Prod. Man., W. Farr.		
Vice Pres., H. H. Doering.	Pur. Agent, P. D. Le Veness.			Sales Man., J. G. Wilmoth.	Chief Engineer, H. Law.		
Vice Pres., N. Platt.	Prod. Man., R. W. Stanley.			Ad. Man., M. M. Roberts.			
Treasurer, M. R. Leathers.	Export Man., N. Platt.			<b>Simms Motor Car Corporation, Atlanta, Ga.</b>			
Secretary, M. R. Leathers.	Chief Eng., E. I. Rusk.			Simms	4-A	5-Pas. Touring	
Sales Man., H. H. Doering.				<b>Simplex Automobile Co., Long Island City, N. Y.</b>			
<b>Ree Motor Car Co., Lansing, Mich.</b>				Simplex-Crane	Touring		\$7,000
Reo	T 6	Touring	\$1,850	<b>Singer Motor Co., Inc., Mt. Vernon, N. Y.</b>			
	U 6	Roadster	1,850	Singer	Open		\$6,500
	T 6 8	Sedan	2,750		Closed		8,600 up
	U 6 C	Coupe	2,700	<b>Skelton Motors Corporation, St. Louis, Mo.</b>			
President, R. E. Olds.	Manager, R. H. Scott.			Skelton	35	Touring	\$1,295
Vice Pres., H. P. Thomas.	Sales Man., R. C. Rueschaw.				35	Roadster	1,295
Vice Pres., R. H. Scott.	Pur. Agent, G. E. Smith.			President, L. S. Skelton.	Gen. Man., W. A. Chapman.		
Treasurer, D. E. Beggs.	Factory Man., H. C. Teel.			Treasurer, Sydney Penniman.	Ad. Man., Glen Hutchinson.		
Secretary, D. E. Beggs.	Engineer, H. T. Thomas.			Secretary, John T. Lockton.	Pur. Agent, John A. Schroeder.		
<b>Revere Motor Car Corporation, Logansport, Ind.</b>				Vice Pres., W. A. Chapman.	Prod. Man., John A. Schroeder.		
Revere	4-Pas. Touring		\$4,850	<b>Southern Automobile Manufacturing Co., Memphis, Tenn.</b>			
	Roadster		4,650	Southern	6-60	7-Pas.	\$2,995
	Speedster		4,850		6-61	5-Pas.	2,995
	Sedan		6,500		6-62	3-Pas.	2,995
President, Newton Van Zandt.	Secretary, E. R. Mattingly.			President, W. A. King.	Pur. Agent, W. G. Schutte.		
Vice Pres., A. A. Seagraves.	Pur. Agent, J. M. Ryan.			Treasurer, W. A. Shibley.	Export Man., M. A. Thornton.		
Treasurer, C. H. Wilson.				Secretary, W. A. Shibley.	Prod. Man., W. G. Schutte.		
<b>Rock Falls Manufacturing Co., Sterling, Ill.</b>				Sales Man., M. A. Thornton.	Chief Eng., W. G. Schutte.		
Rock Falls Car	1921	Limousine	\$4,800	<b>Spacke Machine &amp; Tool Co., Indianapolis, Ind.</b>			
	1921	Sedan	5,000	Brook	S-21	Roadster	\$395
President, E. G. Brookfield.	Ad. Man., E. G. Brookfield.			President, D. S. Brooks.	Ad. Man., A. B. Sutton.		
Vice Pres., H. J. Brookfield.	Pur. Agent, P. J. MacDonnell.			Vice Pres., J. R. Short.	Pur. Agent, F. B. Harlam.		
Secretary, C. E. Bensinger.	Prod. Man., E. G. Brookfield.			Treasurer, William H. MacFee.	Prod. Man., T. G. Morrissey.		
Treasurer, E. G. Brookfield.	Chief Engineer, W. H. Thomas.			Secretary, William H. MacFee.	Export Man., A. B. Sutton.		
Sales Man., E. J. Kelly.				Sales Man., A. B. Sutton.			
<b>Rolls-Royce of America, Inc., Springfield, O.</b>				<b>Standard Steel Car Co., Pittsburgh, Pa.</b>			
Rolls-Royce	Chassis		\$11,750	Standard	7-Pas. Vestibule Sedan		\$5,000
	English Chassis		13,500		7-Pas. Sedan		4,800
<b>R. &amp; V. Motor Co., E. Moline, Ill.</b>					4-Pas. Sedanette		4,500
R & V Knight	6 Cylinder J	7-Pas. Touring	\$3,350		4-Pas. Coupe		4,500
	6 Cylinder J	7-Pas. Sedan	4,200		7-Pas. Touring		3,400
	6 Cylinder J	4-Pas. Sport	3,350				
	6 Cylinder J	4-Pas. Coupe	4,000				
	6 Cylinder J	2-Pas. Roadster	3,350				
	4 Cylinder R	5-Pas. Touring					
	4 Cylinder R	5-Pas. Sedan					







# Tarvia-KP

FOR COLD PATCHING

Patrol maintenance  
crew patching with  
"Tarvia-KP."

## Get Your Roads Ready Now for the Spring Traffic—



The hole to be patched  
is cleaned and the bot-  
tom and sides are  
painted with "Tarvia-  
KP."

**W**HEN the snow goes, look  
at your roads. Have they  
been scarred by winter?  
Are they pitted with  
small holes?

With the coming of  
Spring traffic, small,  
easily-filled holes may  
grow into expensive re-  
pair jobs, if they aren't patched in time.

"Tarvia-KP" is the  
perfect patching material  
for surface breaks and  
holes of any size in any  
type of hard-surface road.

It requires no heating



The mixture of  
"Tarvia-KP," stone  
and sand, is placed  
in the prepared hole.

and is extremely easy to prepare, handle  
and apply. Freezing does not injure it.

"Tarvia-KP" patching material may  
be mixed at any time and stored until  
needed. It makes a smooth, even, per-  
fectly bonded patch—a patch that be-  
comes an integral part of the road itself.

*There is only one "KP" and that is  
"Tarvia-KP" patching material made by  
The Barrett Company.*

Our nearest office will  
gladly send you an illus-  
trated manual of instruc-  
tions showing each step  
in patching a road with  
"Tarvia-KP."



The mixture is well  
tamped and covered  
with screenings.

New York  
Detroit  
Salt Lake City  
Johnstown  
Elizabeth

Chicago  
New Orleans  
Seattle  
Lebanon  
Buffalo

Philadelphia  
Birmingham  
Peoria  
Youngstown  
Baltimore

Boston  
Kansas City  
Atlanta  
Toledo  
Omaha

The *Barrett* Company

St. Louis  
Minneapolis  
Duluth  
Columbus  
Houston

Cleveland  
Dallas  
Milwaukee  
Richmond  
Denver

Cincinnati  
Nashville  
Bangor  
Latrobe  
Jacksonville

Pittsburgh  
Syracuse  
Washington  
Bethlehem

THE BARRETT COMPANY, Limited:

Montreal

Toronto

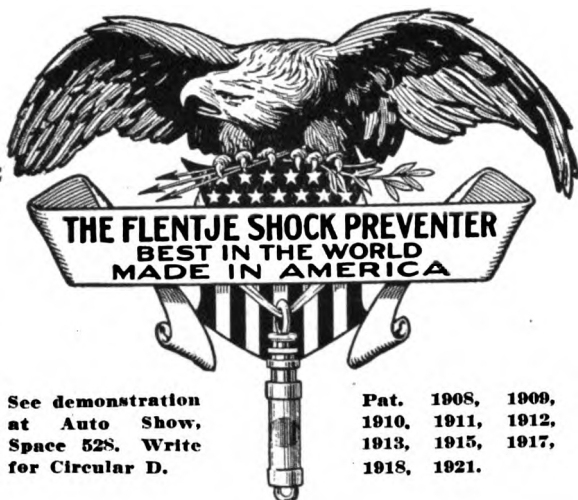
Winnipeg

Vancouver

St. John, N. B.

Halifax, N. S.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



See demonstration  
at Auto Show,  
Space 528. Write  
for Circular D.

Pat. 1908, 1909,  
1910, 1911, 1912,  
1913, 1915, 1917,  
1918, 1921.

Backed up with  
\$5000 a side. Our  
competitors have  
never taken up our  
challenge. Why?  
Because the Flentje  
is 100% perfect.  
We prove this with  
thousands of satis-  
fied customers.

### 30 DAYS FREE TRIAL

Two-Year Guarantee  
95% more safety,  
50% saved on tires  
and upkeep.

**Ernst Flentje, Cambridge, Mass.**

Telephone Cambridge 950

## COES *The Standard WRENCH*



**WRENCHES** that are  
made for the hardest  
service. They do not break  
but grip and hold and their  
efficiency never lessens.

Economy tools as they  
last longer, give better ser-  
vice and never become use-  
less through wear.

Utility wrenches of the  
highest order for car owners  
and repairers as they can be  
used in compact places and  
once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the  
exact size to meet your need. They recommend  
Coes Wrenches as all good dealers have for more  
than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.

# TRADE OUTLET

### AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Bee,  
Overland and 200 other makes.

Motors, \$20.00 up	E. Presto Tanks, \$4.00
Magnetos, \$8.50 up	B. Presto Tanks, \$4.75
Cylinders, \$8.00 up	Bearings, 50c up
Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,  
Write Us—We Have It.

**Conn. Auto Parts Co., Inc.**

18-20 Morgan St., Hartford, Conn.

### AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,  
STEVENS-DURYEA, KNOX, OVER-  
LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.00 up
Carburetors, 8.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

**BRIGHTMAN AUTO EXCHANGE**

321 Windsor Ave., Hartford, Conn.

### —CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have  
to offer. 20,000 Buyers Read These Ad-  
vertisements.

### PURITAN MACHINE COMPANY.

Lafayette Blvd., at 10th Street,  
Detroit, Michigan.

New Parts for all Cars.

Radiators, Wheels, Rims, Starting Motors, Gen-  
erators, Colls, Gears, Axle Shafts, Universal  
Joints, Etc.

Eastern Branch,

245 West 55th St., New York City.

Send Your Repair Work to Specialists.

We Are Experts in  
STARTING, LIGHTING, IGNITION.



308 Knoxville Avenue,  
Peoria, Illinois.

### COTTON WASTE, WIPING RAGS, CHEESECLOTH.

Adapted for automobile use, in ¼ lb.  
and 1 lb. cotton bags and paper cartons.  
SOFT, CLEAN, WHITE COTTON  
WASTE.

Assorted wiping rags—New, clean sani-  
tary. Sample on request.

STANDARD WASTE & RAG CO.  
555 W. 51st St. N. Y. C.

### Classified Advertising BRINGS BIG RETURNS

20 Cents a Line, Seven Words to Line.

### Auto Mailing Lists

Send for our free complete Price List  
covering Auto Dealers, Owners, Ford  
Dealers, Truck Dealers and Owners,  
Garages, Auto Mfrs. and etc., any state.  
A. F. WILLIAMS, Mgr. of List Dept.  
168 W. Adams St., Chicago. Franklin 1182.

AUTOISTS, DEALERS—A transparent celluloid  
cement. Mends side curtain lights equal to new.  
Waterproof. Satisfaction guaranteed. Mends  
anything celluloid. 50 cents post paid. Special  
price to dealers. De-Ho-Ve Specialties, Station  
L, 40-M, New York City.

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### PARTS FOR WESTON-MOTT AXLE.

(E. R. T., Everett, Mass.)

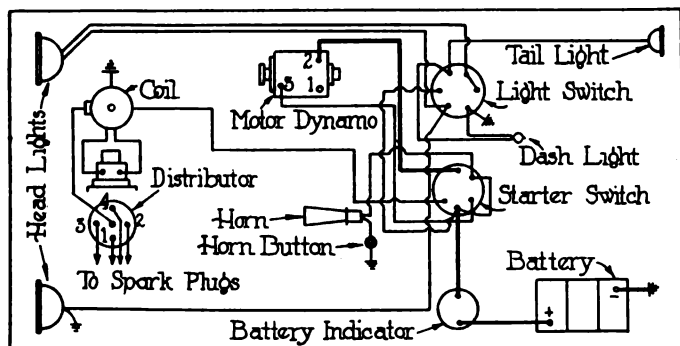
Will you kindly let me know where I can purchase parts for the Weston-Mott three-quarter floating axle?

Most any of the large parts dealers in New York city can supply you with parts for the Weston-Mott axle, or you can obtain them from the factory, which is located in Flint, Mich. Such concerns as Barney's Auto Parts Co., 236 West 50th street, New York city, also may have them in stock, or probably the Noyes-Buick Co., 857 Commonwealth avenue, Boston, Mass., may have it on hand or could get it.

### REGAL WIRING DIAGRAM.

(J. H. D., Chicago, Ill.)

I would like to see published in the query department a wiring diagram of the 1916 Regal car. It is a single unit system, using Dyneto generator and Connecticut ignition.



The wiring diagram of Regal 1916 equipped with Dyneto generator and Connecticut ignition is shown in the accompanying diagram.

### WANTS ADDRESS OF SAFETY CRANK MANUFACTURER.

(J. F. P., Nyack, N. Y.)

Kindly tell me through the columns of the Automobile Journal where I may obtain a safety starting crank for my Chevrolet car.

Manufacturers have advertised in the columns of the Automobile Journal and we have frequently shown in the New Accessory department safety starting cranks of various types. By referring to back issues of the journal you should be able to find what you require.

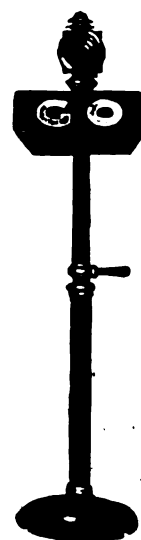
### ENGINE STARTS HARD DURING COLD WEATHER.

(J. V., Chicago, Ill.)

I have a 1920 Reo which is very hard to start when cold. I think the starting motor does not turn the engine over fast enough. Can I connect two six-volt batteries in multiple to turn the motor over faster? Will it damage the starting motor and will it do any good?

You do not state whether your car is a six-cylinder or a four, but we presume that it is a six as this was the engine used in the passenger car during 1920, while the Reo Speed Wagon used a four-cylinder. The Reo passenger car, with the newly designed engine, was introduced early in 1920 and this engine uses the Rayfield carburetor, while the Speed Wagon uses the Johnston carburetor.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



## PICK-UP

ANY attempt to convey in words an impression of the wonderful pick-up which a Zenith Carburetor gives to a motor is bound to fall short of its aim.

Even to refer to the fact that De Palma's world record for acceleration was made in a Zenith-equipped car is inadequate.

But to sit behind a Zenith-equipped motor, waiting for the traffic signal "Go", and then to feel its response at the first touch upon the throttle—that is truly convincing.

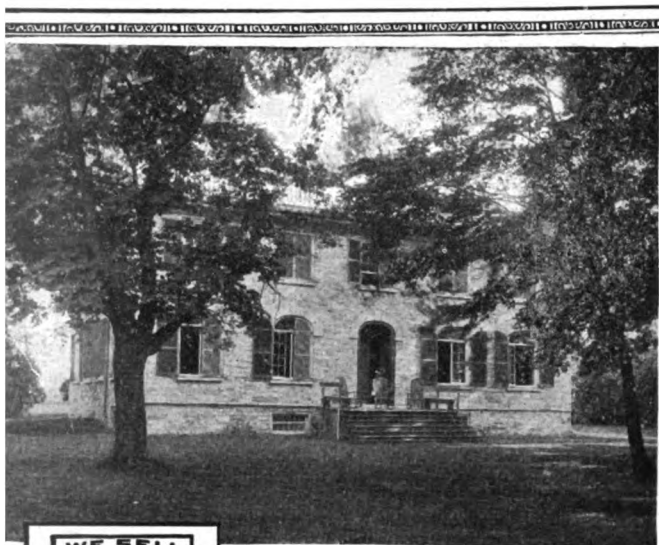
### Zenith Carburetor Co.

New York  
Lyons

DETROIT  
London

Chicago  
Turin





*The house built for Napoleon Bonaparte at Cape Vincent, N. Y., in 1818. Several of his political friends, hoping for his release from St. Helena, built it with the intention of bringing him here to spend his days in exile.*

*Every motor highway and byway throughout picturesque New England and New York is a part of the long "Socony Trail".*

**WHEREVER** motor vehicles go, Socony service has made it easy to keep well supplied with motor fuel and oils.

An unequalled experience in petroleum refining and distribution has made Socony gasoline the standard motor fuel today.

Socony vaporizes quickly—it is a low boiling-point gasoline. As a result, it is easily ignited, combustion is complete, carbonization is slight, and every gallon is crammed full of power. Use Socony regularly for quick starting in cold weather.

Socony dealers are always glad to render the little courtesies that make motoring service complete—a helping hand, road directions. They are always dependable. Look for the red, white and blue Socony sign.

STANDARD OIL CO. OF NEW YORK

**SOCONY**  
REG. U.S. PAT. OFF.  
**MOTOR GASOLINE**  
"Every Gallon the Same"

Many motorists find that as soon as cold weather sets in they experience difficulty in starting the engine after the car has been standing for a time. To overcome this many owners are having primers fitted to their engines which draw the gasoline from the fuel line and force it, by means of a small pump located in the dash, to the intake manifold of the engine and convey it under pressure, in the form a mist, against the intake valves and into the combustion chamber. Starting the engine is facilitated and the storage battery is saved an enormous drain, as continuous cranking of the engine with the starter draws heavily on the battery, requiring many miles of driving between 20 and 25 miles an hour to recharge again.

Adding a second battery, connected in multiple, might help to turn the engine over faster provided the brushes are clean and fit the commutator properly. The voltage would remain the same, but the capacity of the battery in ampere hours would be doubled, provided the amperage was the same in each when connected. If the amperage is down to 25 in one battery and up to 50 in the second they would probably average 25 after a few minutes connection.

No particular harm would come to the starting motor from connecting two batteries in this manner, but the practise is not to be recommended, as the original battery should be sufficient to turn the engine, provided that connections, brushes, bearings, etc., are clean and properly adjusted.

If the battery is weak, this can easily be determined by a battery station repairer, testing with a hydrometer, the reading showing whether the battery is exhausted or low. If the reading shows below 1280 have the battery removed and recharged. If the reading is 1380 it is fully charged and you should look elsewhere for the slow starting. Adding the primer will prevent the battery from becoming exhausted quickly, and testing will show its condition, and prove whether the battery is at fault, or some unit in the starting motor.

Still another point that may cause the starting motor to turn over slowly, or not to start at all, is the connections at the battery terminals. Corrosion will prevent the current from flowing, offering resistance, and causing motor to turn over slowly, or the connections may be loose and the starting motor will not turn, although the battery shows full charge. Clean the connections with sand paper, coat with vaseline or cup grease and tighten.

#### SPARK PLUG FOULS.

(C. W. W., Chelsea, Mass.)

I have a 1920 Chevrolet 490 and have had trouble with the third cylinder. This one plug fouls up with light soot in from 75 to 100 miles, depending upon whether the car is driven fast or slow.

The piston rings fit perfectly and there is no oil passing by the rings. The walls of the cylinders are in good condition and the engine has good compression. A number of different mechanics have checked up the engine, but cannot seem to locate the defect.

This may be due to faulty distribution, improperly adjusted spark plug points, a leak in the terminal wire insulation which would cause the plug to short and not fire at the points, or to a cracked porcelain insulator in the plug.

Try a new plug in the No. 3 cylinder. If this does not correct the defect, remove the No. 3 terminal wire from the plug and take it out back to the distributor, replacing it with a new high-tension wire. If the insulation is cracked, substituting a new wire should cure the defect.

If the trouble is caused by faulty distribution, note whether the high-tension wire leading to No. 3 cylinder fits the terminal on top of the distributor. If loose, this may cause the trouble. Remove the head of the distributor and examine the points of contact of the distributor arm. Possibly one of the points may be damaged, preventing the high-tension current from jumping the slight gap. A new distributor cover will cure the trouble if this is the case.

(When Writing to Advertisers, Please Mention the Automobile Journal.)





**Tiger Forge  
No. 253**

Large fire pot; convenient hearth; splendid blast; strong construction; for severe service; a long, safe investment.

**Power Drill**

No. 36; 20-inch with back gear; power feed automatic stop; bores 0 to 1 1/2 in.; drills to center of 21-in. circle; Morse taper spindle socket No. 3 or No. 4.



**No. 36**



**No. 16**

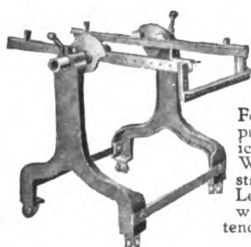
**Post Drill**

No. 16, embodying the fine features of a machine shop floor drill; hand lever feed; positive self feed; adjustable table; bores 0 to 1 1/2 inches to center of 24-in. circle.



**No. 4**

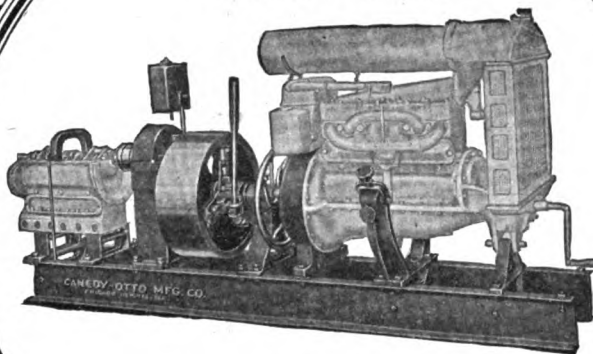
No. 4, wheel guards; tight-and-loose pulleys; strong construction; superior bearings; with or without rests as specified.



**Universal  
Motor  
Stand**

For garage repair and service stations. Will take any standard motor. Length over all when fully extended 48 inches.

**Canedy-Otto  
Combination Burning-in and  
Running-in Machine**



**Running-in and Burning-in  
a Fordson Tractor Motor**

## Less than an hour's work for that burning-in job

**T**HERE is profit for you in quick shop operations. There is power-saving, labor-saving and time-saving in Canedy-Otto Combination Burning-in and Running-in machine. Multiply these savings on every job and you will realize what a boon to the trade this equipment affords.

This combination machine—designed with special skill to serve the automotive repair trade—is compact, speedy, accurate and reasonable in price. Its nicely balanced fly wheel, heavy duty toggle type clutch, rigid construction and absence of vibration are notable characteristics.

## Canedy-Otto Equipment

embodies essential machines for your shop. Their superior qualities have been carefully developed for 30 years by skilled men who make our plant the scene of their life work. And **EVERY PART** of every machine is made entirely by us.

Write for your copy of these interesting pamphlets—  
Use the coupon

**Canedy-Otto  
Manufacturing  
Company**  
Dept. AGJ  
Chicago Heights, Ill.

**Canedy-Otto Mfg. Co., Dept. AGJ**  
Chicago Heights, Ill.

Gentlemen: Please send me the pamphlet describing the machine or machines checked below:

CHECK ITEMS YOU ARE INTERESTED IN:

- |  |   |
|--|---|
| <input type="checkbox"/> Floor Drills                        | <input type="checkbox"/> Wall or Post Drills  |
| <input type="checkbox"/> Forges                              | <input type="checkbox"/> Automotive Equipment |
| <input type="checkbox"/> Grinders and Counter Shafts         |   |
| <input type="checkbox"/> Blowers, Punchers, Shears and Misc. |   |

Name \_\_\_\_\_

Address \_\_\_\_\_

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TRADE MARK  
**EAGLEINE**  
REGISTERED  
**MOTOR  
OILS**



**\$ AVE \$**

**FUEL,  
OPERATING COST,  
REPAIR EXPENSE**

**INSURES**

**CAR EFFICIENCY,  
CAR SERVICE LIFE,  
FULL CAR SATISFACTION**

EAGLEINE Quality has been proven by years of experience of motorists who know.

EAGLEINE Oils are made in grades for all engines.

They cost no more than inferior oils; they are sold in sealed containers in sizes to meet all requirements.

Measured by service EAGLEINE oils are the cheapest.

Start your saving with EAGLEINE today.

Sold by all dealers or direct.

**EAGLE OIL AND SUPPLY CO.**  
**44-45-46 India Street, Boston, Mass.**

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**Woolworth Building**

**CHICAGO**  
**1132 W. 37th Street**

**AUTOMOBILE  
JOURNAL**  
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

THE AUTOMOBILE JOURNAL,  
PUBLISHED MONTHLY AT PAWTUCKET, R. I.  
For April 1, 1921.

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the Automobile Journal and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

PUBLISHER, WM. H. & D. O. BLACK.....Providence, R. I.  
EDITOR, W. B. WATSON.....Pawtucket, R. I.  
MANAGING EDITOR, W. B. WATSON.....Pawtucket, R. I.  
BUSINESS MANAGER, WM. H. BLACK.....Providence, R. I.

2. That the owners are:

WM. H. BLACK.....Providence, R. I.  
D. O. BLACK.....Providence, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee.....Providence, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holder appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed)

WILLIAM H. BLACK, Co-Partner.

Sworn to and subscribed before me this 2nd day of April, 1921.

(Signed)

THOMAS RESWICK, Notary Public.

[Seal]

(My commission expires June 30, 1923.)

(When Writing to Advertisers, Please Mention the Automobile Journal.)

# AUTOMOBILE JOURNAL

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Published Monthly by the  
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WILLIAM H. BLACK.....Treasurer  
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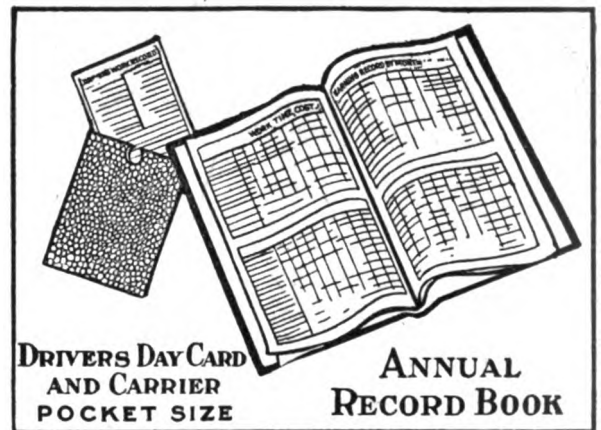
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**Know what it costs to Run your Truck**  
**Learn what your Truck Earns**  
**Know your Truck Profit and Loss**

## UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

**Price \$12.50—Delivered**

Address Record Department

**MOTOR TRUCK**

**Pawtucket,**

**Rhode Island.**

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# Dealer's General Assortment of LANE'S UNIQUE TOOLS



Dealers, you can safely give your personal guarantee on every Lane "Unique" Socket Wrench Set in this group. Furthermore, every Tool in this assortment is a quick "turn-over."

Lane was the first to discover that broached sockets, turned from solid, round bar steel, were the strongest, most accurate, and most satisfactory sockets to sell.

Jobbers can furnish Lane's Unique Tools.

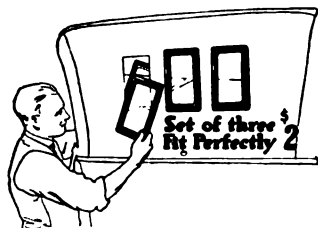
Made by

## Will B. Lane Unique Tool Company

170 West Randolph St.,

Chicago, Illinois

### HASTINGS



### Genuine Hastings Curtain Lights Now Only \$2 Per Set

A nation-wide distribution, coupled with the great demand, has enormously increased the production of the Hastings Glass Curtain Lights for Fords. This larger production has brought costs down.

We are, therefore, able to reduce the retail price of these fast-selling lights to \$2. (\$2.25 west of the Rockies.)

Hastings Lights were the original glass curtain lights for Fords—and are still the only fully satisfactory ones. They fit the present opening. Metal frame front and rear. Strongly reinforced mounting. Finished in black enamel. Anyone can install. Make the car look better and worth more.

### They Are Money Makers

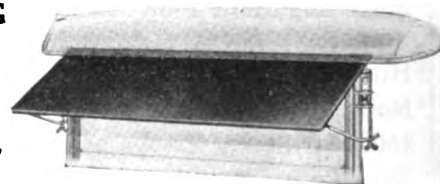
Hastings Glass Curtain Lights have always been quick sellers; now with the new, low prices, they are going to prove still greater money-makers for dealers. Other Hastings Ford necessities include bumpers, front and rear, tire carriers of all types for Ford cars and trucks, stabilizers and battery boxes. They form a mighty profitable line for you to handle. You can get them through your jobber. We will gladly send complete catalog of the full line.

**Hastings Manufacturing Company**  
26 Mill Street, Hastings, Mich.

### AN EXPANDING STEEL FRAME

Keeps covering of the See-Wel always taut

ONLY TWO SIZES fit ALL open and closed cars. Canopy is easily adjustable to ANY ANGLE to suit vision while driving. Universal Clamps fit ANY SHAPE Windshield Post.



The SEE-WEL Windshield CANOPY

#### RETAIL PRICES

Standard Finish (Black Top, Black Underside)	\$8.50
De Luxe Finish (Black Top, Green Underside)	\$10.00
Ford Special (Touring Car and Roadster).	
Standard Finish	\$6.50
De Luxe Finish	\$7.50

#### INTRODUCTORY OFFER

THE MODEL & METALWORK MFG. CO.,  
122 Opera Place, Cincinnati, O.

Send full information how to obtain FREE DEMONSTRATION SEE-WEL CANOPY.

Name .....  
Address .....

### BE-BE-CO. Motor Specialties

Made to a quality that affords superior results.

Leather Top Dressing  
Mohair Top Dressing  
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Seat and Slip Cover  
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Body Polish  
"Red Fox" Motor Car Soap  
O-Se Easy Hand Soap

Tire Paint  
Rim Paint  
Patching Cement  
Gasket Cement  
Carbon Remover  
Tar Remover  
Nickel Polish  
Brass Polish  
Vulcanizing Cement

Sold in varying sized container or bulk with unconditional guarantee of replacement if in any way defective.

Catalogue and discount sheets at request.

### BOSTON BLACKING CO.

EAST CAMBRIDGE

Third Street

MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)





**R.A. N° 9583**

NAME Car Owner.

ADDRESS 460 Washington Avenue.

DATE 1-20-19.

Req. No.	Part No.	NAME OF PART	Quantity	Price	Amount	Total
4751	5973	Flywheel	1	15 75	15 75	15 75
	1500	Push rods	2	No Charge - Guarantee		
		Labor - Flywheel			9 25	25 00
		Labor - Push rods		No Charge - Policy		
		Wash Car and Polish		1 50		26 50
		<b>Total</b>				<b>26 50</b>

Fig. 1-B.

market for a commercial vehicle.

Poor service has lost more sales than have ever been recorded against it and, by the same token, good service has gained in exact ratio, all of which means that some far-seeing dealer has gained that which another, less far-sighted, has lost.

#### Organizing the Service Department.

The first step to be determined in the organization of the service department is its scope and responsibilities. Having decided this important point, which must to a great extent be governed by local conditions, and the size of the agent's business and equipment, the question of personnel next presents itself.

At this stage of the organization great care and good judgment should be exercised. The manager of the station should be appointed, not so much from the standpoint of mechanical efficiency, but rather because of marked ability to handle complaints in connection with the

in importance is the service salesman. This man should be a mechanic and a salesman as well. He should be able to discuss with an owner the trouble with the car or truck, should diplomatically recommend certain repairs, and, most important, should be willing at all times to check up the entire mechanism of the vehicle, part by part, in order to properly diagnose the condition of the machine. If it is necessary for him to put on overalls and crawl under the engine, or drive the car for a road test of its general condition, he should willingly do so, as this is

business. He must be accommodating and polite and a person of considerable tact in the handling of customers. Courtesy is so closely allied with service that the two are almost synonymous. It costs nothing, and the lack of it is an expense that cannot be measured. Other factors being equal, the service station that carries a large line of this intangible article will show results far ahead of those that do not include it in their business conduct.

Next to the service station manager be a thorough-going

practically the only way that a really intelligent order for repairs or parts can be made.

It frequently has happened that certain poorly managed service stations, anxious to keep their force of mechanics intact during slack seasons, have resorted to downright piracy methods in servicing cars, doing work that was uncalled for and, all too often, charging a customer for work that was not done. The result has been that the customer who, regardless of his mechanical ability is not always without means of checking up the job, has eventually realized that he was being unfairly dealt with and, in consequence, the service station has gained a bad reputation. The writer knows of one small sales and service station that has changed hands five times within the year as the result of such methods. The average owner of today has a fairly good idea of just what needs to be done to his car or truck in the line of repairs.

**Good Service Salesman Can More Than Earn Salary.**

An order should be written up clearly and distinctly, and should have the cus-

**THIS IS YOUR INVOICE**

**R.A. N° 9583**

NAME Mr. Car Owner

ADDRESS 460 Washington Avenue

DATE 2-2-19.

Req. No.	Part No.	NAME OF PART	Quantity	Price	Amount	Total
		<b>To Repairs as Specified</b>				<b>26 50</b>

Fig. 1-C.

tomer's name, address and telephone number carefully noted. This is important as is also the careful writing of the order for the parts to be supplied, the repairs to be made and to just what extent the engine or chassis is to be overhauled. Incidentally, a good salesman can more than earn his salary by suggesting new accessories to the customer. It is possible that he needs, or soon will need, a new tire or tube. It may also be possible to interest him in a new horn, or a newly patented windshield cleaner, and the salesman who is on to his job will do much to make the service station pay. As a matter of fact the salesman is of as great importance as the station manager, in so far as the details of the business are concerned, and reflects the manager's policies at all times.

#### Serving the Car or Truck.

After the order has been taken and the price estimated, the next important step is the servicing of the car. Great care should be exercised to see that only competent mechanics are employed, and they must be specifically instructed as follows:

First, to make only such repairs as are called for. Second, to make all such repairs in a thoroughly workmanlike manner. Third, to see that no grease or dirt

**REPAIR SHOP REQUISITION**

TO THE STOREKEEPER

1-3

PLEASE FURNISH THE FOLLOWING FOR USE ON REPAIR ORDER NO. 9583

PART NO.	MODEL	DESCRIPTION	QUANTITY	PRICE EACH	TOTAL AMOUNT	COST
11300	854	Push Rods	4			
<i>Guaranteed by Service Manager</i>						

RECEIVED BY \_\_\_\_\_ DEPT. NO. \_\_\_\_\_

SIGNATURE \_\_\_\_\_

Fig. 3-A.

<b>WORK TICKET</b> Customer's Name <u>J. Jones</u> Employee's No. <u>12</u> R. A. No. <u>9583</u> Date <u>1-31-</u>		
<b>WORK TO BE DONE</b>		
	Hours Charge	Hours No Chg.
① Install new Flywheel		
② Install 2 Push Rods		
O. K. <span style="float: right;">Foreman</span> RETURN THIS SLIP TO FOREMAN WHEN LEAVING JOB		

FIG. 2.

is allowed to get on the cushions, upholstery or paint of the car. Fourth, to place all rugs, robes, tools and accessories belonging to the owner in a locker prepared for the purpose, and to be directly responsible for their safety. Fifth, to keep a time record of work done, showing just how much time was taken on each separate part of the job. Sixth, to keep a record of all parts used.

Whenever a car is sent to the shop for overhauling it is good practise to note all scratches, dents or blemishes, as this avoids controversy with the owner in the vent of his claiming that the damage was done while the car was in the station. This will result in avoiding much future annoyance to the owner and to the dealer as well.

#### Promising Delivery of Car.

The shop foreman should be consulted at all times when the important question of delivering the finished job comes up. Too many times the service station manager or salesman, in order to please the customer, or avoid turning him away, will promise work for immediate attention which, as a matter of fact, cannot be attended to for a week, due to work already in hand. Dissatisfaction among customers results and the best way is to tell them frankly just when the car will be ready, regardless of when it may be. The diplomatic man will have little trouble in convincing the customer of his sincerity, and the result will eventually be a satisfied clientele, regardless of whether a few transient customers are lost or not. Building for permanency demands that the customer be dealt with fairly, and the successful dealer realizes the truth of the assertion.

A vital feature in turning back the car, and one to which too few station owners pay attention, is that of washing and polishing. Even if it is necessary to charge for this work in the original estimate, it should by all means be done, as it has a psychological effect on the

customer that cannot but help the dealer's future business. The customer who receives the car in the same dirty condition in which he left it may get the impression that repairs have not been carefully made, but if he receives it with a spick and span body and a clean motor, he unconsciously gets the impression of high class workmanship.

#### Printed Forms for the Service Station.

To aid dealers in keeping an accurate record of all transactions relating to service on customers' cars, the writer has listed a series of forms which can be readily set up by any job printer. It is obvious that all of the forms cannot be adopted by the small dealer, but they can be used as the nucleus of other forms, and can be added to or revised as the dealer desires. The repair order and

invoice form shown in Fig. 1-A authorizes repairs on customer or company cars and trucks, and provides on the reverse side for a record of the work done and the material issued. The number of copies required will vary in accordance with the size of the organization.

The original and customer's copy should be filled in by the person taking the order from the customer. By making a carbon copy the customer will have a copy of the original order which he signs. The blank spaces on the form are self-explanatory. This form shows just what repairs are desired and the amount of the charge. Each item on the order should be numbered thus:

1. Install new flywhele. 2. Install two new push rods. 3. Wash car and polish.

The column in this form, subdivided into parts and labor, are the key to the complete understanding the service department should have with the customer before any of the work is started. As an example: If a new axle is to be installed the customer should be told what he will have to pay for parts and labor. In this case the letter X should be placed in the charge column under P and also under I, thus signifying that a set price has been established. If, however, the customer is to be charged for the labor, and the part is furnished free because of the guarantee, an X should be placed in the charge column under L, and a G under P and also in the no charge column under L. If work is done gratis, for a policy reason, use the letter P in the no-charge column.

If the entire question is one of guarantee, requiring further investigation before a decision can be handed down, this also should be noted on the repair order. By carefully filling out the form the service department and the customer will thoroughly understand beforehand for what parts and labor the customer is expected to pay.

After the customer's order is taken he will sign on the signature line and the salesman, or order taker, will give him

REPAIR SHOP CREDIT REQUISITION							
TO THE STOREKEEPER:				1-30 19			
CREDIT REPAIR ORDER NO. <u>9583</u> WITH THE FOLLOWING STOCK RETURNED HEREWITH:							
REASON FOR RETURN <u>Only 2 needed</u>				RETURN AUTHORIZED BY			
PART NO.	MODEL	DESCRIPTION	QUANTITY	PRICE EACH	TOTAL AMOUNT	COST	
11320	854	Push Rods					
RECEIVED THE ABOVE IN GOOD CONDITION							
STOREKEEPER							

Fig. 3-B.

Fig. 4[illegible]

**Fig. 5.**

Fig. 2 shows a form that is used to record the time the workmen put in on each repair job, as well as the work performed. It is issued in duplicate by the shop foreman or his clerk, and is then entered on the repair order when that particular job is finished. Time "in" and time "out" should be clearly marked on every work ticket, and it is recommend-

Date									Total R. A Time	Clock Card Time	Elapsed Time	Reason
Name	R.A	R.A	R.A	R.A	R.A	R.A	R.A					
J. Jones	9573											
Time	9								9	9		
H Smith	- 9585	9587	9586	9587	9588							
Time	1	3	½	2	2				8½	9	½	No time
B Allen	9589	9590										
Time	2	1							3	3		Sick
Time												
Time												
Time												
Time												
Time												
Time												
Time												
Time												
Time												
Time												
TOTAL									20½	21	¼	

**Fig. 8.**





his superintendent in checking up the speed with which the men work, the activities of the whole station so far as repairs are concerned, and in giving a clearly defined idea of how the amount of work compares with the actual net profit. This card or report should be made out in duplicate by the shop foreman or his clerk from the time slips, the original going to the station manager, and the duplicate to the shop foreman.

The report shown in Fig. 7 gives the dealer the day's service station business in a detailed form, and should be made out daily by the repair order clerk. It gives a concise idea of the work done, the repair orders put through, the actual cost for labor and materials, the price charged and the estimated price, as well as the net profit or loss on the job. It should be made out in duplicate, the original for the owner of the company and the duplicate for the manager or superintendent.

#### Keeping Account of Gas and Oil.

The writer of this article, while standing in a large service station, saw man after man from the repair shop come up to the gasoline pump, give it a few turns and go back to his work, with amounts ranging from a pint to a half gallon. No attempt was made to keep track of the gasoline used in this way, and subsequent investigation revealed the fact that no account was kept.

"Do you charge it up to profit and loss?" the writer asked. The service station manager thought a moment and then said, "Well, not exactly. We make a flat charge in the bill, one that appears under 'labor,' and I guess we get our money back all right."

The reader must admit that this haphazard way of accounting was either cheating the customer or the owner of the station, and will draw his own conclusions as to who was the loser. Gasoline, used for washing parts, where no special machine for washing with water and lye is available, is almost a necessary expense and there is no reason why the customer should not pay for it. But he should pay for the exact amount used and not for any more. Neither should

Serial No.	Model	Type
	OK	Not OK
Radiator		Clutch
Motor		Gear Shift
Valves		Rear Axle Grease
Ignition		Transmission
Gasoline System		Springs
Carburetor		Wheels—Grease and Alignment
Oiling System		Brakes—Foot and Emergency
Steering Gear		Grease Cups Filled
Fill Crank Case		Body and Upholstery
Electric Starter		Tools
Lights		Crank
Horn		Extra Rims and Straps
Speedometer		Tires
Motometer		Top, Top Boot, Curtains and Mats

Inspected in by \_\_\_\_\_  
**No 247**

---

Serial No.	Model	Type
	OK	Not OK
Radiator		Clutch
Motor		Gear Shift
Valves		Rear Axle Grease
Ignition		Transmission
Gasoline System		Springs
Carburetor		Wheels—Grease and Alignment
Oiling System		Brakes—Foot and Emergency
Steering Gear		Grease Cups Filled
Fill Crank Case		Body and Upholstery
Electric Starter		Tools
Lights		Crank
Horn		Extra Rims and Straps
Speedometer		Tires
Motometer		Top, Top Boot, Curtains and Mats

Inspected in by \_\_\_\_\_  
**No 247**

Fig. 11 Front.

he pay for less than is used, as this means lost profit for the dealer.

There is only one way to handle this very important item, and that is to make an actual charge of the actual amount used, which can be shown in the bill in any way desired. The dealer would not think of letting a customer estimate the amount of gas he took from the pump to fill his gas tank. He would insist on the exact amount being charged for, and in addition to this would do the measuring himself, or have it done by a clerk. The same method of computation should be followed in the use of gasoline for washing repair parts.

Fig. 8 shows a form that can be used to record all gas and cash sales. It can be practically used in all service stations, the number of copies varying in accordance with the number of persons involved in such sales. The usual system is to give one copy to the customer. The purchaser appreciates this as an act of confidence, though he does not even look at it, and the forward looking dealer will see the value of it. Another copy of the

form should be sent to the cashier, and a third copy should be kept by the gas man for his record. The cashier uses his copy for the daily record and to check against the amount of gas received and sold, and any difference in the two amounts can be noted immediately.

#### Cash Sales of Accessories and Parts.

Fig. 9 is a form designed to keep account of cash sales of accessories and parts and, like the blanks for gas and oil, will be practical for use in all service stations regardless of their size, the number of copies of the transaction varying in accordance with the number of persons who are directly interested.

One way to do this is to give all three copies to the cashier. One copy of the slip is retained by the cashier, who stamps the three of them "paid," giving one to the customer and the third to the clerk.

Sales and supply are checked up either daily or weekly as desired, but the writer has found that up-to-the-minute service stations make a practise of knowing where they stand at least twice a week.

#### Identification of the Job.

This identification tag is a strawboard tag divided by perforation into two parts. It should be fastened on to every car coming into the station for repairs. Made out by the repair order clerk, it tells the story in detail and makes it possible for any employee to attend to the car owner when he returns for his machine in case the regular clerk is absent. This tag not only tells what has been done to the car in the way of repairs, but has space for much other data, all of which will be found necessary in servicing the car in a workmanlike manner. And good workmanship applies just as much to keep accurate account of the repair of the machine as it does to the actual work of doing the job.

Parts or Equipment "Taken From" or "Added To" While in Possession of Branch as Follows:		
Description	Off or On	Regulation Number

Please designate whether "Taken Off" or "Put On" by so marking in column provided

I hereby acknowledge receipt of car as per number and description on opposite side of this card.

Signed \_\_\_\_\_

REMARKS:

Fig. 11 Back.

NAME		No
Car owner		1903
ADDRESS		
460 Washington Ave		
R. A.		9583
NAME		No
Car owner		1903
ADDRESS		
460 Washington Ave		
DATE IN		1-30-
R. A.		9583
INSPECTORS O. K.		
MODEL		85-4
LICENSE		43251
THIS TAG MUST BE TURNED INTO OFFICE WHEN WORK IS COMPLETED		

Fig. 10.

# HUMOROUS SIDE OF MOTORING

## MADE AN IMPRESSION ALL RIGHT.

The young man on the train, observing that the handsome girl across the aisle was looking at him very intently thought he had made an impression and in a few moments he changed his seat to the vacant one beside her.

"Haven't we met before somewhere?" he ventured to ask.

"Well, I'm not quite sure," she replied, "but I think you are the man I saw hanging around the night our automobile was stolen."

The young man vanished into the smoking car, amid the snickers of those who had overheard them.—Boston Transcript.

## NOT ENOUGH CLASS.

Frank Preble is the foreman on a construction contract over in Cambridge, and the other day a pair of bricklayers approached him with reference to a job. It needed only a short conference to arrange the matter, and Preble hired the men. Then one of them said:

"Where do I park my car?"

"Where do you what?" said Preble.

"Where do I park my car?" repeated the bricklayer. "I drive a car and come to work in it every morning."

"You drive your car to work every morning, do you?" said Preble. "Well, you can just get off the job, then. The men on this job all have chauffeurs for their cars—you piker!"

## ALWAYS KEYED UP.

"Does your wife wait for the least little thing on your part to make trouble?"

"Dear me, no; she's not so slow as all that. She's a self-starter."—Baltimore American.

## PRECIOUS LIQUID.

"Gasoline continues to smell worse."

"I'm glad of it," declared Mr. Chuggins. "If the odor were made agreeable they'd proceed immediately to charge perfumery prices."

## POSSIBLY PROOFREADER WAS RIGHT.

"Where's that infernal proofreader?" shouted an irate man with blood in each eye.

"He certainly would be right hard to find now," said the editor uneasily. "What's he done this time?"

"In the advertisement for my valveless motor he turned the second v into a u!"

## MALICIOUS MISUNDERSTANDING.

Wifey—Won't you buy me a car, pet?

Friend Husband—No, carpets are unsanitary, let's get a rug.

## GO EASY, PLEASE, YOUR HONOR.

Judge—Have you any excuse to offer before I fine you for speeding?

Victim—Yes, Your Honor. It's like this: I heard that there was a cook out of a job. I had to hurry to get her before some one else beat me to it.

## CONSERVING HER CACKLE.

A. O. Vick has a smart hen. She lays in his flivver and when she deposits an egg instead of cackling to announce the glad tidings she jumps on the horn of the car, which gives forth a blast.—Lincoln Ledger.

## NO GOOD TRYING IT ON THE COP.

"What's the matter down the street?"

"Another optimist has come to grief."

"How?"

"He thought the size of his car and a manner that keeps his clerks on the jump would overawe a traffic policeman."

## NOT WORTH MENTIONING.

"Any accident on your motor trip, Morgan?"

"Nothing worth mentioning. My wife was thrown out and bruised a bit, but the machine never got so much as a scratch."

## NEEDS SPEED IN HIS BUSINESS.

At the local club they were comparing notes as to the speed and other qualities of their cars, when Stevenson remarked:

"That man Smythe, who has a suburban real estate development, has the fastest car in this part of the country. He makes 70 miles an hour."

"Great Scott!" exclaimed a listener. "What does he want a car like that for?"

"He's got to have it when he's advertising his property as being five minutes from the station!"

## ACCOUNTED FOR THE SPLASH.

A farmer and his wife drove to town in the flivver one day after a very wet night when the roads were rough and full of large pools of water. When the journey was nearly completed a friend drew up and accosted the driver.

"And how are you today?" was the friendly greeting.

"Very well, thank you," answered the farmer.

"How is the missus?" continued the friend. "Fine," answered the farmer. "She's behind there"—jerking his thumb toward the back of the car. "She's not there!" exclaimed the astonished friend. The farmer turned and looked over his shoulder. Then he coolly replied: "Humph! That accounts for the splash."

## PUT TO THE PROOF.

Angelina—I don't believe you were sincere when you said you'd die for me.

Edwin—Indeed I was, dearest.

Angelina—Then why don't you let me drive the car when you take me out motoring?

## SOME SWEET RUNNING ENGINE.

"What's that humming sound?"

"That's a bumble bee."

"He's got a mighty good engine."



# NOTES OF INDUSTRY AND TRADE

## \$5000 for Safety Essays by Children

Five thousand dollars in prizes for essays on safety by school children has been voted by the National Automobile

stimulation of an active public interest in safety will prove the best means of reducing accidents.

Full details concerning the distribution of these prizes and methods of awards will be announced in the near future. The car makers will work

## Is to Manufacture New Passenger Cars

A new company, known as the Gray Motor Corporation, has been formed at Detroit for the manufacture of a new automobile in four models. The prime movers in the enterprise are Frank L. Klingensmith, who recently resigned as vice president and treasurer of the Ford Motor Co., and Frank F. Beall, for many years vice president in charge of manufacturing of the Packard Motor Car Co.

The company will occupy the factory and equipment of the former Gray Motor Co., Mack avenue and the Terminal railroad.

A four-cylinder motor designed by Mr. Beall will go into the new machine. It has a long stroke, small bore and overhead valves, for which simplicity and economy are promised. The wheelbase will be 112 inches and the four-cylinder overhead motor 3½ by 5.

The car will be marketed through about 10 distributing centers, these having assembly plants. The cars will be shipped from Detroit unassembled, thereby reducing expenses from the Detroit office. It automatically will lower freight charges to the purchaser.

Before coming to Detroit Mr. Beall was in the bicycle manufacturing business and spent 12 years with Browne & Sharpe in Providence, R. I. He was one of that company's chief executives when he resigned to join the Packard staff.

William A. Blackburn, for 12 years with the Cadillac Motor Car Co., will be factory manager of the new corporation.

The officers are as follows: President, Frank L. Klingensmith; vice president and general manager, Frank F. Beall; treasurer, George H. Krichner, president of the First State bank of Detroit; secretary and assistant treasurer, J. B. Moran.



Plant of the Durant Motor Co. of New York, \$3,000,000 Corporation. First of Chain of Independently Organized Assembly Plants Located at Strategic Distributing Points. These Companies Are to Be Operated Under a Contract with Durant Motors, Inc., Which Will Supervise Production.

Chamber of Commerce as part of a campaign to educate the careless motorist; or, if he cannot learn, to drive him off the streets.

Public opinion is regarded as the best weapon. Interest on the part of school children is calculated to impress the subject of automobile safety on their elders, and to bring up the younger generation with consideration for human life.

Millions of motorists are suffering for the sins of the few. Fatalities in relation to number of cars have been cut in half in five years; but the total number of automobiles is so great that even a small fraction of reckless drivers presents a serious problem.

### Pedestrians 78 Per Cent. Responsible.

Added to the harm of the careless driver is the reckless pedestrian. Police Commissioner Enright of New York says that his records show that 78 per cent. of the automobile accidents are the fault of pedestrians, failing to cross at corners, running past the traffic officer, jaywalking. Education can minimize this evil.

Playgrounds are the remedy, however, the car makers believe, for the hazards of children playing in the street. "Children have a right to play" is one of the main principles of this campaign; and any safety programme implies advocacy of adequate play areas.

The National Automobile Chamber of Commerce has, over a long period of years, campaigned for proper brake mechanism, uniform traffic legislation and adequate instruction for new drivers. It believes, however, that proper enforcement of the present laws and

through recognized official, safety and playground agencies so that the benefit of the best experience may make the prizes most effective.

### SHERIDAN PERFECTION EQUIPPED.

Announcement has just been made by the Perfection Heater and Manufacturing Co., Cleveland, O., that a contract has been closed with the Sheridan Motors Co., Muncie, Ind., whereby Perfection heaters will be a standard equipment on all Sheridan closed cars. This comfort feature is in keeping with the Sheridan slogan, "The Complete Car."



New Factory Building of Badger Manufacturing Co. in Milwaukee, Wis., Is of Cement and Brick Construction and Exceptionally Well Lighted and Ventilated.



## Dodge Brothers' New Power Plant and Cooling Tower

One of the predominant features of the expansion programme being rapidly brought to consummation by Dodge Brothers, the well known Detroit motor car manufacturers, is the immense new power plant, which is illustrated herewith.

Tons and tons of coal will be consumed there beneath eight huge boilers, but not one shovel will be in sight. It is to be a "shovel-less" plant from beginning to end. No coal will be shoveled in and no ashes will be shoveled out. Everything is to be automatic. A car dumps its fuel cargo into a hopper and passes on. Soon another car comes and receives a load of ashes—and no human hand will have touched the coal in the entire process of transformation.

The power plant is designed for an installed capacity of 40,000 kilowatts and it requires approximately 25,000 gallons of water a minute for each 10,000 kilowatt unit. There is no natural water supply within miles of the factory. To take water from the city mains and then waste it after passing once through the condenser, would be out of the question. Not only would the cost be prohibitive—it would be about 70 cents a thousand cubic feet, or \$560 an hour—but the drain of the city's supply would be far too heavy. In other instances where simi-

lar problems presented themselves the solution has been found in a cooling pond, a large reservoir where the water was stored and used over and over again. In this case, however, so large a tract was not available. Not only are property prices extremely high, but there was danger that the spray rising from such a pond would damage newly manufactured cars and parts. So this plan also was abandoned.

From this problem or conglomeration of problems grew the plans for what has now become the largest cooling tower in the world—a structure 146 feet long, 32 feet wide and 104 feet high. It is capable of cooling 18,000 gallons of water a minute from a temperature of 105 to 85 degrees when the outside temperature is 72 degrees and the relative humidity is 69 per cent. With other atmospheric conditions the water will be cooled to within 25 degrees of the existing dew point with a minimum temperature of 45 degrees. This tower effectively disposes of the problem which confronted Dodge Brothers construction engineers. It makes possible the repeated use of the same supply of water, with a loss of only five per cent. due to evaporation. The tower is of the most substantial type, capable of withstanding a wind pressure of 90 miles an hour.

Four immense stacks, each 270 feet high and 13 feet in diameter, are being erected. They will be among the largest in the country. Although the power house was not started until May 18, 1920, it is now practically ready for operation. The first fire was started Feb. 1. Many of the factory executives were present to observe the ceremonies. Built at a cost of \$3,500,000, the power plant is without question one of the engineering triumphs of modern industry. It is significant, in this connection, to observe that the entire plant was built by Dodge Brothers construction department. With this plant in operation the factory is safeguarded against any future emergencies such as the breakdown of the central power plant, on which many of Detroit's largest industries are dependent.

The new power house is only one of a number of large expansion projects now in progress at Dodge Brothers, the total cost of which will be approximately \$8,000,000.

### TIMELY NEW LITERATURE OF INTEREST TO THE TRADE.

The Barrett Co., maker of the well known Tarvia products, has just issued from the press a set of booklets showing the application of Tarvia on roads and for other purposes.

These brochures are entitled, respectively, "Tarvia Pavements—A Booklet Showing Step by Step in Actual Photographs the Construction of a Tarvia Pavement;" "How a Tarvia Macadam Roadway Is Constructed" and "Tarvia Preserves Roads, Prevents Dust." These are all illustrated in the superb manner characteristic of Tarvia publicity, and the text is replete with interesting and valuable information concerning road construction and maintenance and similar matters.

The Barrett Co. maintains distribution headquarters in all of the principal cities of America and Canada.

### CONNECTICUT CO. AWARDED ANOTHER INJUNCTION.

It is stated that Judge Frank Cooper of the United States District Court of northern New York has made a decision by which a permanent injunction is made in behalf of the Connecticut Telephone & Electric Co., Meriden, Conn., restraining the Denlinger Lamp & Ignition Co., Rochester, N. Y., from the sale of ignition parts which it is claimed were made in imitation of and violating the patents of the plaintiff company.

The Connecticut company is endeavoring by means of court action, as well as by the education of the trade, to eliminate from the market the imitation parts which it claims are of inferior quality, unfailingly give poor service and cause dissatisfaction to users of the Connecticut system.



*New Power Plant of  
Dodge Brothers Detroit—  
Will have four smokestacks  
each 270 feet high*

## Operation and Care of Motor Car Engines

**I**T CANNOT be impressed too strongly upon the mind of the motor vehicle owner that no matter how well the engine of the power plant is made that it requires a reasonable amount of care and attention and this must be contributed by the owner or operator if the engine is to function successfully.

A few minutes of concentrated abuse will perceptibly shorten the life of the finest engine made and this is best demonstrated when an operator races the engine for several minutes just after starting the engine on a cold morning, laboring under the impression that by racing the engine he is warming it up quickly and getting the engine to a point where it will develop its full power. The temperature must be raised to a sufficient point before the engine will develop its rated horsepower, but this is properly done by allowing the engine to idle for several minutes before starting work. Idling speed, if practised moderately, will not harm a heavy duty engine, but racing the engine will do untold damage to the bearings and internal

will, however, tend to lower as it is heated and will be found low even after a few minutes driving. Do not let this fact worry you as no harm will come to the engine under normal conditions.

Never fill the radiator with cold water while the engine is running nor when the engine is hot, especially if the amount of water in the radiator is low. A sudden change of temperature in the cooling system is liable to cause the cylinder castings to crack.

Always make a practise of using clean water as free from lime, rust and impurities as possible. Clean rain water, when it can be obtained, is best, as it will keep the water jackets of the engine and the core of the radiator free from lime. Water spaces coated with lime or other impurities reduce the conductivity of the water, causing the engine to overheat, increasing oil consumption and reducing the life of the engine.

### Filling Gasoline Tank.

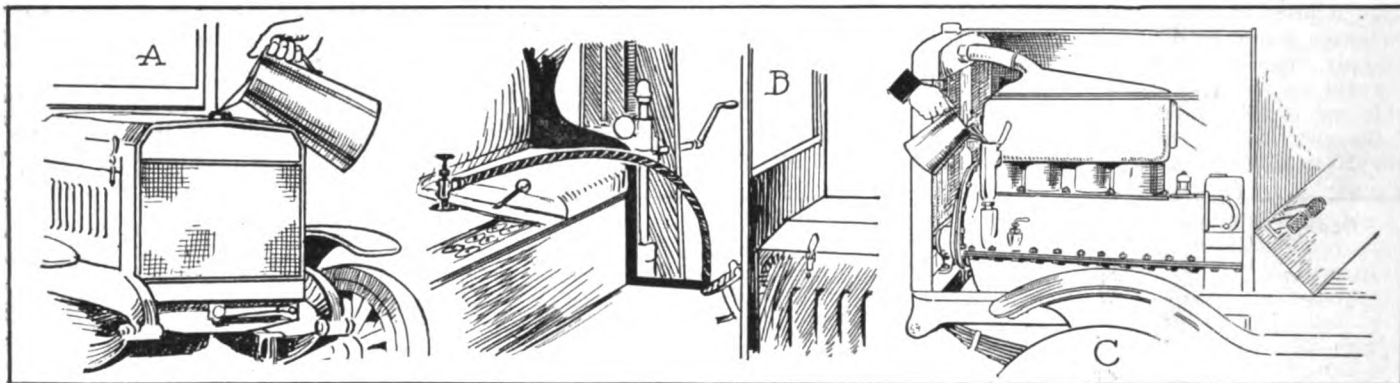
Next fill the gasoline tank. Use nothing but the best grade, as it gives the most power and does not carbonize the

There are usually three or four places that require lubrication on the modern heavy duty engine and these are usually the fan, water pump, magneto and oil reservoir in the engine pan. The pump and fan require a good grade of grease, while the magneto requires only a few drops of very fine grade oil about once in every 1000 miles of use. The oil reservoir in the engine base requires oil daily as the engine in heavy duty work uses oil more rapidly than in passenger car use. The lubricant is put into the reservoir through the breather and filler tube and in the grease cups by removing the caps.

Many engines are provided with a combined breather and oil filler tube, which acts as a ventilator for the crank case to prevent crank case pressure and increased temperature.

Never fill the engine too full of oil, as it will cause carbon to form and foul the spark plugs. A careful driver will soon learn how much oil an engine is needed for each 100-mile trip.

It is essential that the oil in the reser-



A, the Radiator Should Receive First Attention; B, Next Fill the Gasoline Tank; C, the Oil Reservoir Should Be Filled with a Good Oil.

parts, especially when it is raced without a load.

Many a trouble may be traced to some simple thing, like a carelessly made connection, dirt in the gasoline, a broken wire, a broken spark plug, etc., and drivers who understand the operation of an engine never condemn it for slips which are due to carelessness.

### Preparing the Engine for Operation.

A little care used in preparing the engine for operation may save a great deal of trouble and possibly repairs at a later time.

The radiator should be the first unit to receive attention. See that all drain cocks in the water system are closed and fill the radiator with clean water. Make sure each morning before starting the car that the radiator is full and always keep it supplied with plenty of water, to prevent the engine overheating.

In an engine with thermo-syphon cooling this point is absolutely necessary, because the water will not circulate freely unless the top tank is filled above the inlet. In pump circulation systems it is not quite as important to carry the water high in the tank as the pump will circulate water even though it be low. Water

cylinders as rapidly as low grade gasoline, which also spoils the lubricating qualities of oil.

Always strain the gasoline to remove any water or other impurities that may be present. The use of chamois skin placed over the top of a funnel is particularly good for removing water and sediment. Care should be taken, however, to see that the funnel sets on the top of the tank when filling, as many fires have resulted from leaving a small space between tank and funnel, the gasoline passing through the chamois causing frictional electricity, which causes a spark to jump between the funnel and tank.

Clean the chamolis at frequent intervals to remove sediment and it will be found that gasoline will flow more freely.

### Supplying Lubricant to the Engine.

After the radiator and gasoline tanks have been filled the oil reservoir should be filled with a good oil of the correct body as recommended by the engine manufacturer.

Much trouble and expense will be saved if close attention is given to the lubrication of your engine. If lubrication is neglected but once it can cause any amount of damage and expense.

voir register half way between the two lines shown on the oil level indicator, if an oil indicator is fitted to the engine, or half way on the oil gauge if gauge is used. Therefore you should replenish the supply as soon as the oil level falls below this point. The oil indicator or gauge should always show that you have oil above the half full mark. The grease cups in water pump and fan should always be kept full.

When first starting a new engine do not go above a medium speed until the bearings, pistons and cylinders are running perfectly free. Controlling or governing the speed of the engine is vastly important.

A cold engine should be warmed up slowly, as it is dangerous and detrimental to race or accelerate a cold engine. This does more harm than constant service under full load at correct engine speed. Never race a cold engine, as when this instruction is disregarded and the engine is speeded up beyond the speeds which are indicated by the manufacturer as safe running speeds, you are inviting trouble, repairs and expense, which will soon take your car to the repair shop and may mean heavy expense.

# Personal News of Industry and Trade

## Strout Is Apperson's Eastern Manager

George H. Strout, who has been connected with the Apperson Brothers Automobile Co. for a number of years, has been made manager of the eastern department and, in addition to his new duties, which include general charge of the New England, eastern New York and northern New Jersey territory, he will continue to direct the export business of the company.

H. L. Dipple, formerly president of the H. L. Dipple Co., Indianapolis, Ind., was recently made general manager of the Central Auto Top & Leather Co., Inc., 421 North Capitol avenue, Indianapolis, Ind., maker of automotive accessories, transmission belting, etc. Mr. Dipple brings to his new position a valuable experience gained in important connections in the automotive field.

Harry Eisner of the Eisner-Lenk Co. and the Auto Glare Remover Co., 711 Boylston street, Boston, has returned from a tour of three months and a half abroad with Mrs. Eisner. Mr. Eisner states that he was successful in placing foreign selling rights for the Glare Remover in England, France, Italy, Germany and Switzerland.

George E. Smith has resigned as sales manager of the Simon Sales Co., Detroit, Mich., which position he assumed about a year ago. He is well known for his work in various sections of the country for Willys-Overland, Inc., in connection with sales promotion and efficiency systems.

Harry E. Marshall has been appointed Pacific coast representative of the Mueller Electric Co., Cleveland, O., manufacturer of Universal batteries and test clips. He will be in charge of the company's offices and warehouses at 332 Leavenworth street, San Francisco, Cal.

C. A. Grainger, formerly factory representative of the American Hammered Piston Ring Co., Baltimore, Md., for the southeastern district, has been promoted to be district sales manager of the territory comprising Texas, Missouri, Kansas, Arkansas and Oklahoma.

Saville Baar, who was attached to the Americanization Bureau of the Detroit Chamber of Commerce during the war period, and was also a former representative of the Simon Sales Co., has joined the Studebaker Corporation in Detroit.

Seymour R. Cochrane was recently made director of the sales division of the Allison-Rood Co., Lincoln car distributor in the Chicago territory. He was formerly director of the exchange car division of the company.

Paul M. Hutchins, agent for Hudson and Essex cars at Grand Rapids, Mich., has added the Lafayette car to his line, which he will distribute in western Michigan.



George H. Strout, Who Has Become Eastern Manager for the Apperson Brothers Automobile Co.

W. J. Corr has been elected secretary and treasurer of the Maibohm Motors Co., Sandusky, O., succeeding I. O. Bormann, resigned. Mr. Corr has been director of purchases for the Maibohm Motors Co. for the past year and is widely known in the automotive industry. He was with the General Motors Co. for the first two years following its organization, doing purchasing, cost and systematizing work at the Northway, Cadillac and Oakland plants. For the following two years he was director of purchases of the Apperson Brothers Automobile Co., Kokomo, Ind.; then for two years director of purchases of the Falls Motors Corporation, Sheboygan Falls, Wis. For nearly three years prior to joining the Maibohm organization he was purchasing agent for the Detroit plant of the Aluminum Castings Co.



Homer Hilton, New Vice President and General Sales Manager, Winther Motor Truck Co., Kenosha, Wis.

## Hilton Has Joined the Winther Co.

Homer Hilton has been elected vice president and general sales manager of the Winther Motor Truck Co., Kenosha, Wis. Mr. Hilton is a well known figure in the motor truck industry, just relinquishing the duties of managing director of the National Association of Motor Truck Sales Managers, of which organization he has been a director for some time past. Previous to his direct management of the association affairs he was sales manager of the Oshkosh Motor Truck Manufacturing Co., of which company he was one of the organizers three years ago. He has also been connected with various other organizations in the automotive field.

Fred P. Steele, for many years associated with the automobile industry and favorably known to distributors from coast to coast, has joined the Stutz Motor Car Co. of America, Inc., and will represent the factory in the Atlantic coast district. Homer R. Horsfall, formerly identified with the automobile business in St. Louis, and for the past five years with the Overland, is now connected with the Stutz Motor Car Co. of America, Inc., with sales supervision over the western and Pacific coast territories. Fred Wilson, one of the pioneers of the industry, is now with the Stutz Motor Car Co. of America, Inc., in the capacity of assistant sales manager.

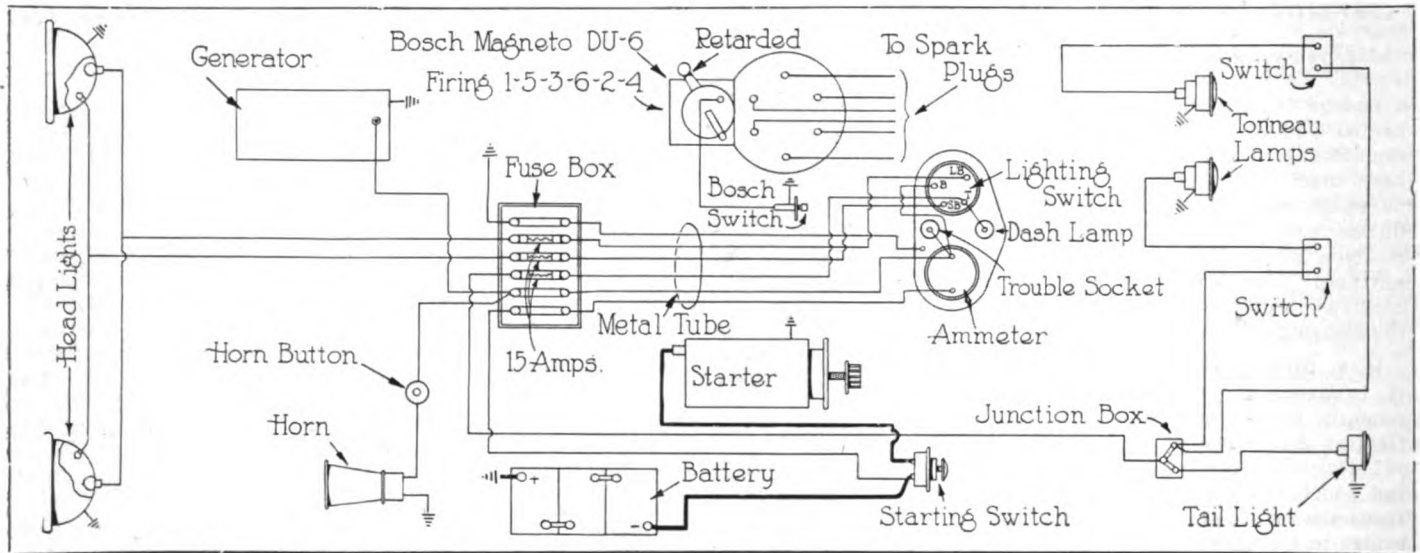
T. B. Blackiston, formerly district sales manager in the southwest territory for the American Hammered Piston Ring Co., Baltimore, Md., has been promoted to the position of assistant general sales manager, replacing J. H. Quackenbush. S. A. Barclay will be district sales manager in charge of the territory formerly supervised by Mr. Blackiston. A. M. Merrifield has been placed in charge of the western and Chicago sales districts as district sales manager, replacing D. T. Preyer.

Roland Rohlf, the well known aviator, who holds the world's altitude record of 34,610 feet, has become a member of the sales force of the Ostendorf Motor Car Corporation, Buffalo, N. Y., which distributes the Franklin car. Mr. Rohlf is the son of Anna Katherine Greene, the noted novelist.

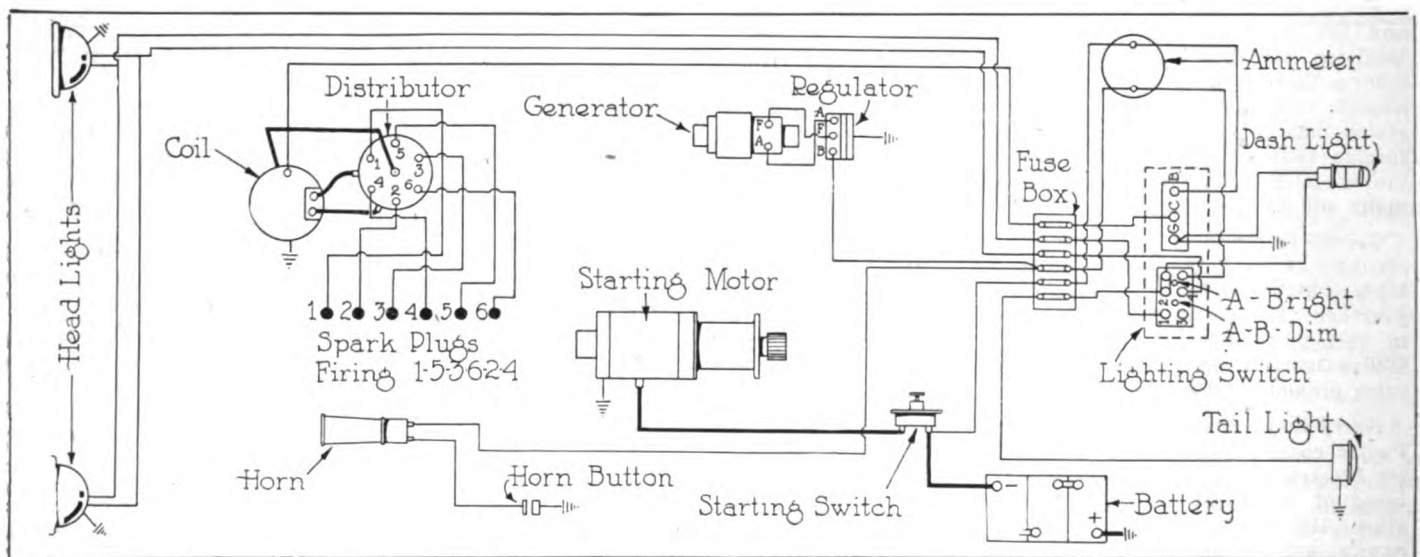
W. R. Melcher, formerly eastern representative of the Gemco Manufacturing Co., has returned to the C. A. Shaler Co., Waupun, Wis., in the capacity of special jobbers' service representative on Shaler vulcanizers and Shaler Roadlighters. Mr. Melcher was associated with the Shaler company in 1918-19.

J. C. Harvey, who has been distributor of Haynes cars at Worcester, Mass., has been placed also in charge of the Boston sales with headquarters at 218 Elliot street. He will retain his sales rooms and service station at 880 Main street, Worcester.

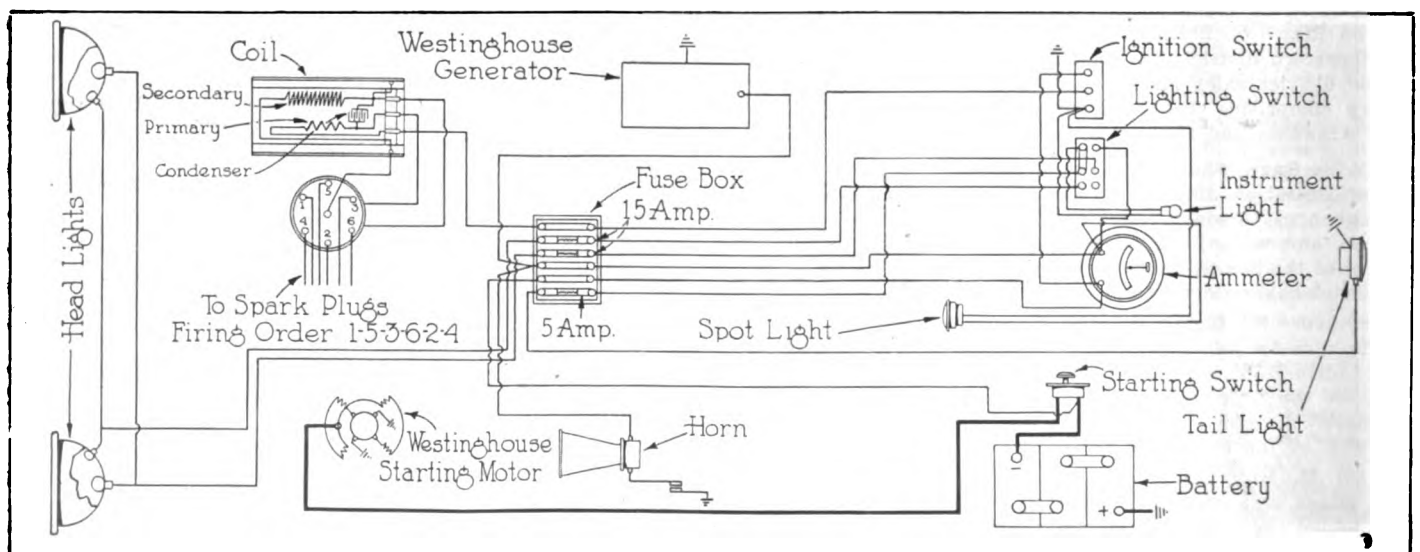
# Monthly Wiring Diagram, No. 14



Lexington 1916, Model 6-N, Two-Unit Single Wire System.



Lexington 1916, 1917 and 1918, Model O, Two-Unit Single-Wire System.



Lexington 1918 and 1919, Series R, Two-Unit, Two-Wire System.



**LET TIRES ABSORB THE SHOCKS.**

A surprising fact in tire conservation is that it is better to run over a rock in the roadway than to hit it a sharp, glancing blow. Of course, such obstacles should be avoided if possible, but when the dilemma of a choice is forced upon the motorist, this decision is best.

To hit a rock head-on may cause a severe jolt, and, furthermore, is likely to stone bruise the tire, but it causes less damage in the end to the tire properly inflated than a sharp blow against the side wall and rim. As explained by tire experts, the reason for this is that the tread of a tire is the part best able to absorb shock incident to normal operating conditions.

Side walls, however, are not intended to be shock absorbers, but to give the carcass of the tire strength and shape. Rubber on the side wall is laid on to protect the tire fabric from the destructive action of the elements.

The tread of a tire is thick and resilient and made to withstand the abrasive action of the road. A layer of cords, heavily imbedded in cushion rubber is, specially designed to neutralize and distribute blows.

With tires constructed in this way, the motorist has little choice if unable to avoid an obstruction, than to take the blow on the tread rather than on the side wall. Careful driving should rarely make such a decision necessary.

**FLASH LAMP VERY HANDY ABOUT THE CAR**

A hand flash lamp should be carried in the tool box of all cars by motorists, especially those that are not already equipped with spot lights or a socket for an extension lamp. Very often the motorist is obliged to stop on some dark road to change a tire or inflate a tube, and the flash light, placed on the ground, will enable him to work to better advantage.

Many motorists carry a flash light to enable them to read sign posts along the road; this is much handier than backing the car and throwing the headlights on the sign, while on many cars the lights will not throw the light high enough so that the sign may be read.

A flash light answers its purpose admirably in another respect: So many holdups are occurring of late and the motorist not equipped with a flash light stands a small chance of identifying the holdup men unless he has some such means of illumination. A light carried on the front seat will prove invaluable to the motorist in more ways than one.

**GETTING CAR OUT OF RUT.**

When one of the rear wheels has got into a mud hole or deep rut so that it springs, apply the emergency brake with gentle pressure. This will give enough resistance to the spinning wheel so that the other wheel can pull the car out of trouble. The decrease in engine speed because of the pressure of the brake can be compensated for by opening the throttle a little.

**Proper Attention to Minor Details Important**

**K**EEPING a motor car in good working order is a simple matter when a regular schedule of lubrication and adjustment is followed. Most operators are conscientious in attending to the minor details during warm and fair weather because they realize that attention to all of the little things goes towards securing more perfect operation of the car. All the year round driving has become the custom rather than the exception, but during the winter there seems to be a tendency on the part of some owners to fall off from the usual routine and sometimes to let slip such matters as attending to grease cups, spring clips, drip pan, etc.

For instance, there is the matter of the body squeaks, which should be attended to when first noticed. They result from the straining and racking of the car due to driving over rough roads and streets, which are usually particularly uneven in the winter. Motor car bodies are securely fastened to the chassis by heavy bolts, which are tightened firmly before leaving the factory. As an additional precaution strips of felt are placed between the body and the frame of the car. Should squeaks of any kind develop in the body they may often be eliminated by simply tightening the body bolts with a wrench, which will draw the body firmly in position again. It is advisable, whether or not squeaks are apparent, to inspect the bolts after driving in cold weather to see that they are drawn snug against the lock washers.

Another simple but essential matter is the proper care of springs. Springs are called on to sustain an extraordinary amount of motion and vibration and when the ground is frozen the shocks they meet are greatly multiplied. The slight effort involved in caring for them will be repaid many times by the added comfort and the protection afforded to all working parts of the car. It is essential that the spring clips be kept tight at all times in order that the spring leaves will be held firmly together. As spring leaves generally break on the rebound, it is necessary that the leaves hold together in order to divide the shock.

At this time of the year it is also advisable to jack up the car, loosen the spring clips and spread the leaves apart, and with a thin, flat instrument liberally smear the surfaces of the spring leaves with a mixture of flake graphite and engine oil. This lubricant will permit the leaves to slip over each other with very little friction, thus giving the same smoothness of action as when the car was new.

It is also a good point, after driving the car for some time in cold weather, to thoroughly clean the cooling system. No matter what kind of anti-freeze mixture is used a certain amount of sediment is bound to settle in parts of the system, or adhere to the walls of the cylinders, water jackets and the radiator. A simple method of cleaning the system is to drain off the water and then turn a hose adjusted so as to admit a moder-

ate stream of water in the filler cap of the radiator. Let the engine run at slow speed, leaving open the petcock at the bottom of the radiator.

Another thing that should be attended to is to check up the brakes and see that they are properly adjusted.

**DISASSEMBLING CLUTCHES.**

The novice who is overhauling his car for the first time and does not know the amount of tension under which the clutch spring does its work, is sure to meet with a great surprise, if he attempts to remove the spring from the clutch hub without making some special provision for handling it.

In the average multiple-disc clutch, and in many cone clutches, the spring is mounted in the hub of a cone or housing and to prevent its expansion the cone or housing is fitted with a cap or flange, held in place by four or six cap screws. A section of such a clutch is shown in the illustration.

To disassemble a clutch it is only necessary to run a long retaining bolt through the center of the housing as shown and after placing a large washer on the other end, screw down on the nut until the retaining flange or cap is tightly gripped. The cap screws may then be removed in safety and the nut backed off the retaining bolt. The bolt should be at least eight inches longer than the distance through the hub, else the repair man will, figuratively speaking, be "between the devil and the deep sea," for he will be unable to remove all the strain from the spring or to replace the cap in place again without considerable trouble.

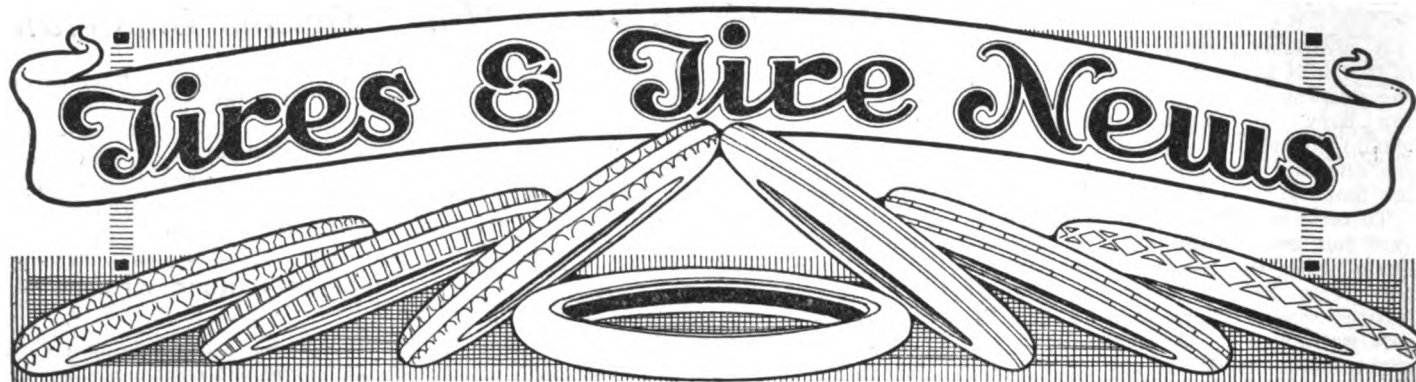
**TO AVOID FIRES.**

It is always advisable to keep the dust pan under the front floor board clean and free from oily rags which are sometimes allowed to accumulate. In the opinion of insurance companies, if oily rags are allowed to remain in the various nooks and crannies around the engine and transmission, they are very apt to cause fire through spontaneous combustion. Needless to say, equal care should be exercised with oily rags around the garage, particularly if they are tucked away in a corner or confined in a receptacle.

Fire extinguishers are like life belts, you may never need one, but they are mighty handy to have when wanted.

**FREE OIL HOLES.**

Many motorists are putting their cars into the paint shop this season. After the car is finished and before it is run to any extent, the chassis should be carefully gone over and all of the small openings, usually oiled with a cup, should be scraped open, especially if they are filled with paint. Attention to this detail and supplying oil to them will rid the chassis of many an annoying squeak.



## Business on Increase at Akron

Business in the tire industry already is showing improvement according to the latest reports from Akron, O., to the Rubber Age.

Each week sees a quickening of the business pulse. Orders for tires are being received in larger numbers. The open winter has been a godsend to the industry, creating a demand for tires greater than in any other year. The effect of this demand is now becoming apparent.

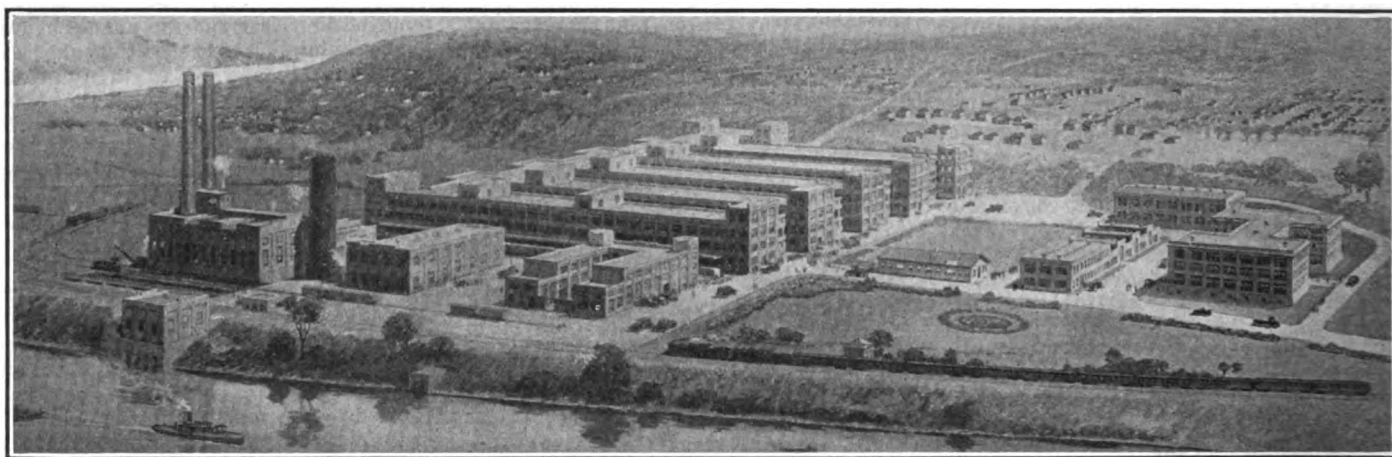
Rubber manufacturers in Akron feel that the depression will ultimately react to the benefit of Akron's industrial life.

over the week before. How long it will be before a normal status returns is merely a matter of conjecture, and one person's guess is as good as another's. It is certain, however, that spring will bring with it an increased demand for tires. We confidently believe that the last six months of the year will be normal.

"In considering what the future has in store one fact must be taken into consideration. That is that the tire industry differs from other industries in respect to the certainty of the demand for its products. Over a period of time, two years, for instance, the demand can be estimated to a very accurate degree. The number of tires needed during that

## Goodrich Shows High Sales Record

It is reported that the annual statement of the financial condition of the B. F. Goodrich Rubber Co., Akron, O., shows that, despite sales for 1920 of \$150,007,345, a new high record, there was a deficit of \$921,248 before payment of taxes, inventory depreciation and dividends. After payment of dividends on the common and preferred stock the deficit was \$5,371,792, compared with a surplus after dividends of \$12,657,813 in 1919. Had the \$8,000,000 set aside for inventory depreciation and the \$3,057,000 for taxes and \$2,000,000 for cost of notes



Kelly-Springfield Tire Co.'s New \$1,000,000 Plant at Cambridge, Md. First Tire Turned Out April 2. Main Factory Is Two Stories High with Mezzanine and Basement and Consists of Main Section, 760 by 120 Feet, with Five Wings, Each 405 by 60 Feet; Floor Area Approximately 20 Acres.

They believe that the future growth of the rubber industry will be gradual and healthy. They expect no sudden leap back into the "peak" activity of a year ago, nor will there be "overnight" expansions which brought thousands of laborers in the past.

In announcing that the number of employees would undoubtedly be materially increased within the next three months, tire company executives emphasize the point that only Akron men will be taken back first. Men who have homes in Akron will be given first chance at the jobs. Many months will probably elapse before men from other cities can find work.

In commenting on the prospects for the future an official of one of the largest companies said:

"Each week is showing improvement

period will not fluctuate greatly regardless of the business conditions of the country.

"For a time motorists may stop buying tires, using their spares and their old casings until they are worn to ribbons. The cessation of buying, however, cannot exist over a long period of time, simply because without tires passenger cars and motor trucks are useless. Sooner or later new tires must be bought, and the longer the period of non-buying the greater the accumulative demand."

### KELLY-SPRINGFIELD TIRE DIVIDEND.

The Kelly-Springfield Tire Co., New York city, has declared a quarterly dividend of \$1.50 a share on its six per cent. preferred stock, payable April 1.

been charged against last year's operations the deficit would have been enlarged by these sums. The items were charged against the profit and loss surplus of previous years, thereby reducing that account from \$41,203,046 on Dec. 31, 1919, to \$22,706,498. Net profits of \$17,304,813 in 1919 were equal to \$25.09 a share on the \$60,000,000 of common stock outstanding.

### TIRE CONCERNS DISSOLVED.

The Ehman Tire & Rubber Co., 176 N. Michigan avenue, Chicago, Ill., has discontinued the manufacture of tires.

Cortland Tire & Rubber Co., manufacturers of Cortland pneumatic automobile tires, Belleville, N. J., has discontinued the manufacture of tires.

## TIRE COMPANIES ELECT OFFICERS.

**Wilson Rubber Co., Canton, O.**—Directors: John S. Willis, Charles Willis, Wendall Herbruck, Henry Bernhard, F. J. Wilson, Harry S. Payer, all of Canton, and Jacob DeKaiser, Louis M. Faber and Dr. Thomas A. Burke of Cleveland. President, John S. Willis; vice president and general manager, F. J. Wilson; secretary and treasurer, Wendall Herbruck.

Announcement is made that this company has begun the construction of a three-story addition, 50 by 100 feet, to its factory, of brick and steel construction, with concrete floors. The plan of construction is such as to permit the ultimate addition of two or more stories when further expansion may demand.

A 10 per cent. dividend was declared to all common stockholders for the year 1920, and announcement was made that the capital had been increased from \$150,000 to \$500,000.

**Kelly-Springfield Tire Co., New York City**—A. B. Jones has been elected president to succeed F. A. Seaman, and Mr. Seaman becomes first vice president. The new president is a graduate of Princeton university and was educated for the engineering profession. Following a connection of some length with the Pennsylvania railroad, he became identified with the Diamond Rubber Co., and later with the B. F. Goodrich Rubber Co., having resigned the office of vice president with the latter company several weeks ago.

**Black Hawk Tire & Rubber Co., Des Moines, Ia.**—Directors re-elected: William Moran, J. J. O'Malley, E. A. Lewis, A. J. McColl, John C. Kirby, Fred German. E. A. Lewis is secretary of the company, H. G. Curtis sales manager, Paul Anderson factory superintendent, and C. E. Riess chemical engineer.

**Victor Rubber Co., Springfield, O.**—President, H. S. Berlin; vice president, W. L. Timmonds, Cleveland; secretary and treasurer, H. H. Durr; sales manager, C. A. Swinehart, Cleveland; factory manager, Frank Talbott.

**Climax Rubber Co., Columbus, O.**—President, Irving S. Hoffman; vice president, Herman A. Longshore; secretary and treasurer, Clyde B. Turner; sales manager, E. W. Pavey.

## OFFICERS OF OLDFIELD TIRE CO.

On behalf of the Oldfield Tire Co. of Akron, O., of which he is president, Barney Oldfield announces the appointment of J. M. Dine as vice president and general manager.

Mr. Dine has been identified with the rubber industry in various capacities for the past 14 years, first with Goodyear and later with Firestone.

Other officers recently chosen were: Secretary, B. M. Robinson; treasurer, H. L. Allsopp, and assistant treasurer, M. E. Moffett.

The Columbia Tire & Rubber Co. has moved from Columbiana, O., to its new offices, West Sixth street, Mansfield.

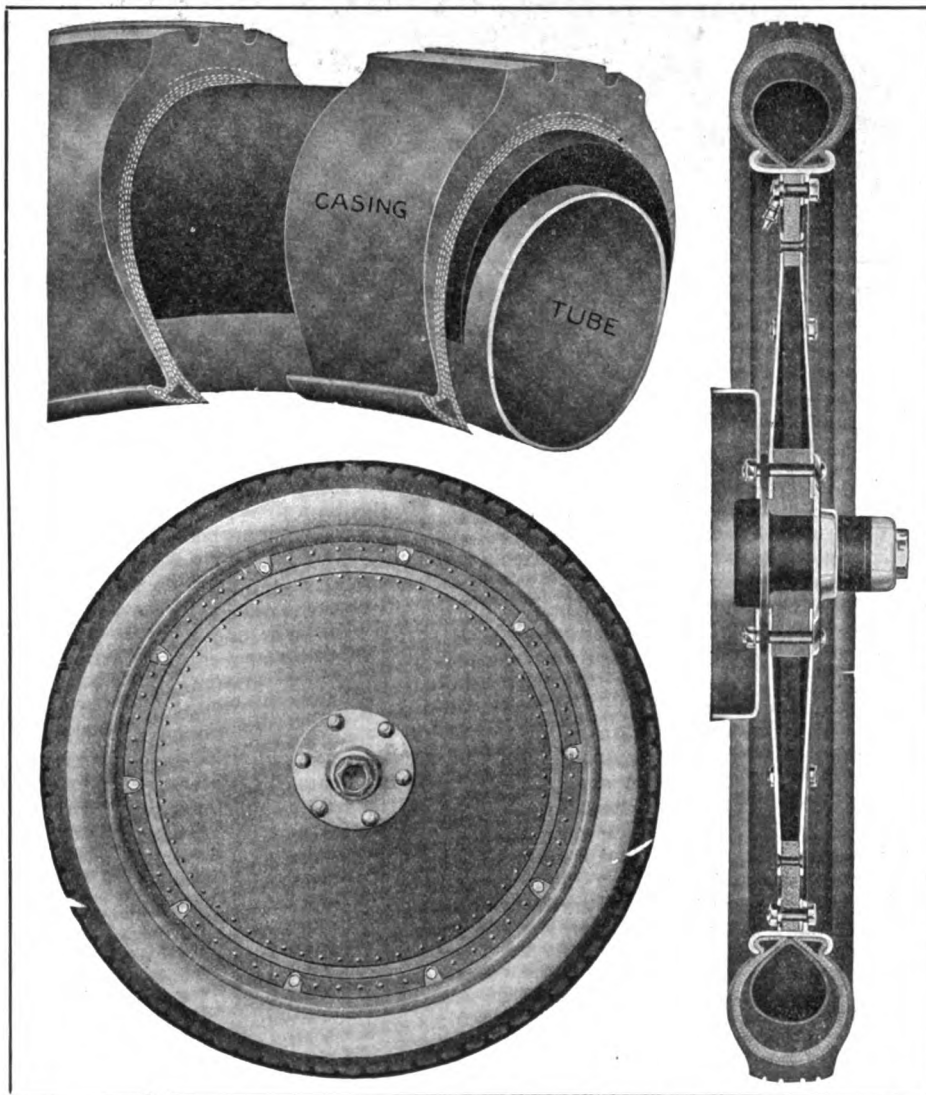
*Two Interesting Products of Hall Syndicate*

Two products of the Hall Syndicate, Inc., 1310 Commonwealth Trust building, Philadelphia, Pa., which are attracting considerable interest in the trade at the present time, are shown in the accompanying illustrations.

The Hall Flexible Wheel has a demountable rim, either straight or clincher, and can be applied to any car without changing the hub or the use of extra parts; the bolts of the old hub are used. The wheel is made up of two steel discs and a  $\frac{1}{2}$ -inch thickness of thoroughly

**Hall Felt Liner.**

The Hall Felt Liner is made of pure wool felt, which is a perfect insulator of heat, thereby preventing the tires from heating up when driving over hot roads at high speed. The felt liner separates the inner tube from the heated tire and keeps the air from getting hot and expanding—the cause of many blowouts. The volume of air necessary in the inner tube is claimed to be reduced, which in turn reduces the strain on the fabric and prevents blow-outs along the side



Two Products of Hall Syndicate, Philadelphia, Which Are Attracting Attention: Top, at Left, Tire Cut Away to Show Hall Felt Liner; Below, at Left, Hall Flexible Wheel; Right, Cross Section of Hall Flexible Wheel.

vulcanized fabric held between the steel rings on the outer edge and the steel discs, by rivets placed about  $1\frac{1}{4}$  inch apart all around the circumference. The outer rings have threaded bushings inserted into which are the bolts which hold the demountable rim in place without the use of lugs. This is accomplished by the use of specially constructed rims which have a vertical member with holes to bolt it against the steel rings riveted to the fabric. The axle is held in suspension. The wheels are made in three sizes, 30, 32 and 34 inches.

walls. By supporting the inner walls of the tire against stone bruises, which cause the fabric to break or crack, the inner tube is prevented from pinching and causing tires to go flat. The felt liner is thick and very hard to penetrate. The weight is but  $2\frac{1}{2}$  pounds for the 30-inch tire. The use of this liner is stated to eliminate tire trouble and to lengthen the life of tires by many thousand miles.

The Hall Syndicate, Inc., is now under production at its plant, 1730 Glenwood avenue, Philadelphia, Pa., with a capacity of 200 wheels a day.

## The Coats, New Steam Car, Embodies Unique Features

ONE of the sensational announcements of the present season is the prospective advent in the market, at an early date, of a new five-passenger, six-cylinder steam touring car,

engine in automotive practise. The housing of each half of the axle carries three fixed cylinders, set at 120 degrees apart, or one-third the circle. These cylinders are exactly like those of the automobile

tor car. As one well known expert said while watching the gauge of the Coats car register 600 pounds boiler pressure—"It has power enough to pull a switch engine."

Yet it is smooth, velvety and flexible to a degree not possible to any other power. Its range in this car is not "three speeds" or "four speeds," but any speed from drifting to 60 miles an hour; and its whole range is controlled by one small lever on the steering wheel. There is not one gear in the power line of the Coats car. The power is never separated from the load to go from one speed to another. Simply move the lever forward and apply more steam—or move the lever back and shut down on the steam. The acceleration, or slowing down, is immediate. The quick getaway of the Coats car is astonishing. From a standstill under power it goes right over a curb.

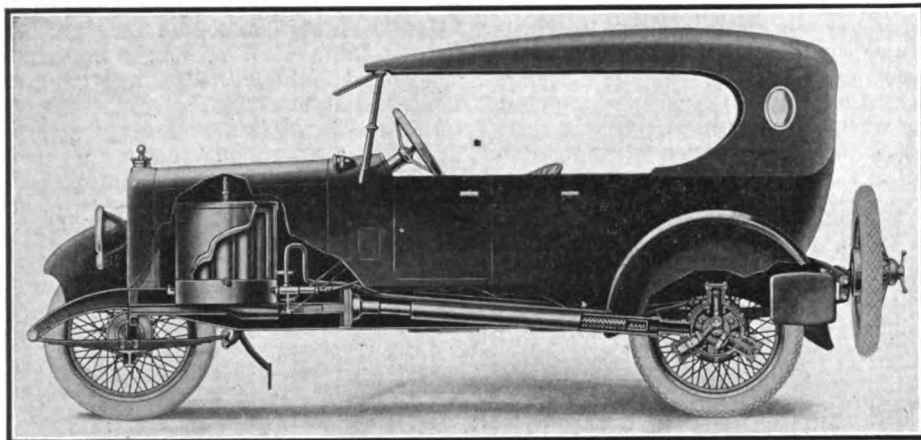
### Store of Reserve Power.

The vital point of difference between the steam car and others is stated to be its store of reserve energy. In the Coats car the great energy stored in the boiler is always instantaneously available. It is built up in advance, is on tap for any emergency. It does not have to wait on combustion. It is a constant flow of power, free from the vibrations which attend the rapid explosions of the finest internal explosive engines made. There is no stored power in an internal explosive engine. As the power is used with each explosion, it is impossible to store it. The flywheel is its only point of storage and power can be stored there only by speeding up, after the need of extra power is upon the car.

### What This Means in Economy.

When the low price of kerosene or crude oil is considered with two or three times the usual car mileage a gallon of fuel, by these cars, it will be realized how practically the Coats enterprise is attempting to answer the call, even more insistent, for economy in car operation.

The Coats car, completely equipped, weighs less than 1800 pounds. It has less than 40 moving parts. It eliminates carburetor, timing gears, magneto, clutch, gearshift flywheel, accelerator, propeller shaft, universal joints and differential.



Cut-Away View of Coats Steam Car Showing Boiler, Steam Line and Three-Cylinders of the Six-Cylinder Engine on Rear Axles. There Are Three Fixed Cylinders for the Drive Shaft of Each Wheel—Connecting Rods Are Pivoted to Crank Pin Integral with Each Shaft—This Gives the Coats Direct Power Application, and Also Includes the Differential Function.

with 110-inch wheelbase and equipped with electric lighting and starting, to retail at about \$1000. Rumors that an important enterprise in the steam car field was soon to be launched have been definitely confirmed by George A. Coats, a well known capitalist and representative of large steam interests at 1213 Merchants' Bank building, Indianapolis, Ind., who states that he is engaged in the perfecting of plans for the manufacture and marketing of a steam car along the lines just mentioned and, furthermore, that on the same chassis he will also build a commercial speed wagon for light delivery purposes.

The construction of the Coats car is reported to embody several distinct advances which have interested leading steam engineers, and for many months the experimental shop has been the Mecca of pilgrimages by steam specialists from all parts of the country.

### A Glance at the Car.

The boiler is of the combination fire-and-water-tube type, so arranged that it will go under a hood of any shape. The top and bottom welding of the tubes, equalizing expansion, reveals advances especially remarked upon by the experts. The insulated steam line leads directly to the rear axle with divided flow to each half of the axle.

It is in this axle that engineers and laymen alike find one of the most fascinating advances in the Coats car, the direct application of the steam to the wheels, absolutely eliminating the geared differential. The rear axle is the engine, or the engine is the rear axle, whichever way you choose to consider it. It is engine, axle and differential functioning all in one, the engine in its housing being just about the size of the ordinary rear axle gear case.

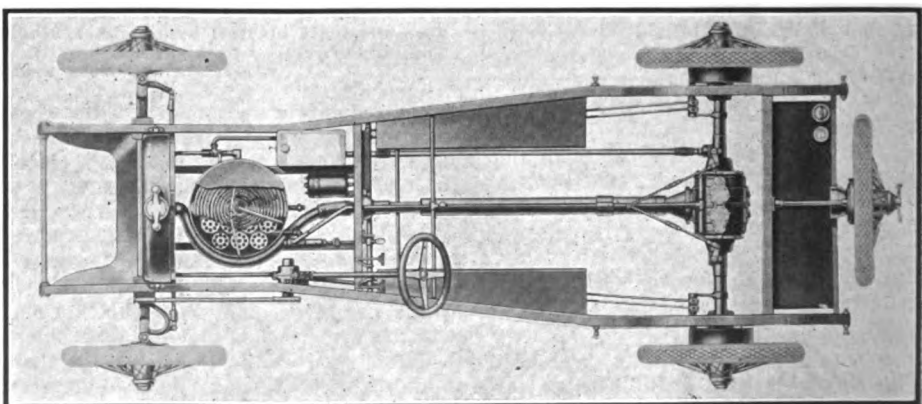
It is without doubt the most compact

engine, with poppet valves, pistons and connecting rods. The bore is  $2\frac{3}{4}$  inches, stroke three inches. The three connecting rods in each half are pivoted to a crank pin integral with the drive shaft of each wheel. At a speed of 40 miles an hour the engine is running at the very low speed of 500 revolutions a minute.

It will be observed that an overlapping stroke is obtained. Before one cylinder is entirely off pressure another has begun to take hold, and the third is completing its exhaust. In actual tests the Coats cars are stated to be doing 20 to 40 miles on one gallon of kerosene. With the Coats steam and water cycle, one filling of the water tank runs the car from 300 to 500 miles. The exhaust steam is taken by return pipe to the condenser, which is located in front of the boiler in the position of the ordinary radiator. The initial heating for starting is electrical, controlled by switch on the cowl board.

### From Drifting to a Mile a Minute.

The characteristics of steam are too well known to require analysis in terms of ordinary rating when applied to a mo-



Plan View of Coats Steam Car—Note That the Engine in Its Housing on Rear Axle Is No Larger Than the Ordinary Rear Axle Gear Case.



Of the saving of tires due to the equalization of weight, the reduction of vibration and the smoothness of interrupted torque, much might be speculated, but that is a point for demonstration in actual use.

In appearance the Coats car is attractive, but not at all radical in design. It has distinctive lines, for Mr. Coats has not underestimated the advantage of dress; and it provides more than usual five-passenger room for its size.

Although a comparatively young man, Mr. Coats has been identified with the automobile industry from the beginning as a field man and distributor of leading cars. Some years ago he acquired coal mines in Indiana, which in large part have furnished the capital for his steam car experiments.

No stock is offered for sale in the Coats concern, as abundant resources have been furnished for making and marketing the passenger car and speed wagon and plans have been made for an expansion of the application of steam on a scale which is not now ready for the announcement of details. It is realized by Mr. Coats and his associates that steam power and steam economy will be equally vital in truck and tractor use.

#### Origin of the Enterprise.

The origin of the present enterprise is interesting. At the beginning of the war the Norwegian government sent an engineer to America to study the development of internal combustion engines. He had completed his reports and was preparing to return home when Mr. Coats met him. The modest inventor laid before Mr. Coats plans for steam on which he had been working for years. These plans so interested the Indianapolis man that he promptly employed the engineer and established him in an experimental shop with a free hand.

The American automobile man's 20 years of experience and the Norwegian engineer's science were combined, with the counsel of the most experienced American steam and automotive engineers, and the Coats cars are the result.

#### The Demand for Steam.

What they presage is an interesting subject. It is certain that in the automotive market something in the way of an epochal advance has been looked for by the motoring public for the last five years, an advance that means more than engineering refinements along present lines, an advance that means more reserve power, more flexible power and especially far greater simplicity of construction and far lower upkeep cost. The Coats car may be the answer. Mr. Coats is confident that it will be.

A. L. Jacobs, Lloyd George and Norman E. Stoneburg are recent additions to the sales organization of the Paterson line of cars at Toledo, O. Mr. Jacobs, who has been with Paterson for the past three years, becomes manager of territory sales. Mr. George, who was formerly of the Standard Garage, and Mr. Stoneburg, formerly of the Marmon agency, will attend to city sales.

## A Glance at the Gasoline Situation for 1921

THE daily average output of petroleum in the United States during the week ending March 19 showed a sharp increase, according to the American Petroleum Institute. Production for the week was 1,259,211 barrels, as compared with 1,241,125 the week before, an increase of 14,090 barrels.

The estimated daily average gross production of the Mid-Continent (light oil) field, including Oklahoma, Kansas, North Texas, Central Texas and North Louisiana, for the week ended March 19, was 649,005 barrels, as compared with 633,815 barrels for the week before, an increase of 15,190 barrels.

The estimated daily average gross production of the gulf coast (heavy oil) field was 109,130 barrels, an increase of 1870 barrels, as compared with the week before.

The combined daily average gross production of the southwest field was 758,135 barrels, an increase of 17,060 barrels.

Oklahoma-Kansas shows a daily average gross production of 372,280 barrels, an increase of 14,315 barrels. North Texas shows an increase of 1850 barrels; Central Texas, an increase of 1430 barrels; North Louisiana shows a decrease of 2405 barrels.

The estimated daily average gross production of Wyoming and Montana was 54,080 barrels, as compared with 56,550 barrels for the week before, a decrease of 2470 barrels.

#### The Gasoline Situation at a Glance.

The estimated demand for gasoline for 1921 by months is shown in the following table developed by Dr. Joseph E. Pogue, oil analyst and consulting engineer of the editorial staff of National Petroleum News:

	Per Cent. of Year's Total Required Each Month	Number of Gallons Required Each Month
January .....	5.4	259,000,000
February .....	5.8	278,000,000
March .....	6.4	307,000,000
April .....	7.2	345,000,000
May .....	8.5	408,000,000
June .....	9.9	475,000,000
July .....	11.2	538,000,000
August .....	11.8	567,000,000
September .....	10.4	501,000,000
October .....	8.8	422,000,000
November .....	7	379,000,000
December .....	6	321,000,000
Total .....	100	4,800,000,000

The total gasoline made in this country in the past three years is: For 1918, 3,570,000,000 gallons; 1919, 3,957,000,000 gallons; 1920, 4,882,000,000 gallons.

The production of gasoline is steadily increasing. The average per month for 1921 was 406,000,000 gallons, while for December it was 464,000,000.

Stocks of gasoline at refineries indicated this increasing production. For Dec. 31 these stocks totaled 462,000,000 gallons—16,000,000 more than the same time the year before. Yet our stocks at the end of September were 288,000,000 gallons, or 83,000,000 less than the year before, and the low point in several

years. Stocks did not exceed that of previous year until the end of December.

Automobile production has been:

	Per Cent. of Increase 1916 in Cars.	Per Cent. of Increase 1916 in Gasoline Production
1916 .....	39	32
1917 .....	70	73
1918 .....	112	92
1919 .....	148	137

The estimated consumption by trucks and cars for 1921 of 4,800,000,000 gallons, is based on a total of 8,500,000 cars and 1,000,000 trucks with their use discounted 10 per cent. over the previous year.

#### STUDEBAKER LIGHT-SIX BREAKS FOUR RECORDS.

In two sensational dashes a Studebaker Light Six recently broke all records for speed between San Francisco and Los Angeles, setting a new mark for the round trip, lowering the coast route record by 2 hours, 35 minutes, 20 seconds, beating the best time ever before made over the valley route, and leaving "The Lark," most famous of the fast coast express trains, 3 hours, 47 minutes and 30 seconds in the rear.

On the first trip the drivers, Hart L. Weaver and James C. Gurley, carried U. S. mail both ways between San Francisco and Los Angeles, being sworn in as Federal officials upon authority from Washington. In fact the journey was made for the purpose of showing the possibilities of the motor car in transporting mail quickly.

The round trip, a distance of 864.8 miles, was covered by the Studebaker in 21 hours 23 minutes. The trip down, over the coast route, a distance of 413.7 miles, was made in 10 hours, 12 minutes, 30 seconds, as compared with the previous best record of 12 hours, 47 minutes, 50 seconds, established in 1916.

The car and "The Lark" started their dash to Los Angeles at the same time, and it was on this occasion that the Light Six beat the train's schedule by over 3½ hours.

After hanging up these records the Studebaker drivers went after the fourth and only remaining speed mark—that of lowering the previous best time over the valley route. They succeeded in making the trip from Los Angeles to San Francisco over this route, a distance of 411.1 miles, in 9 hours, 15 minutes, 50 seconds, of which time 35 minutes was spent in crossing the ferry to San Francisco. This record-breaking time was made under difficult weather conditions the pilots being forced to drive through a dense fog 120 miles of the way.

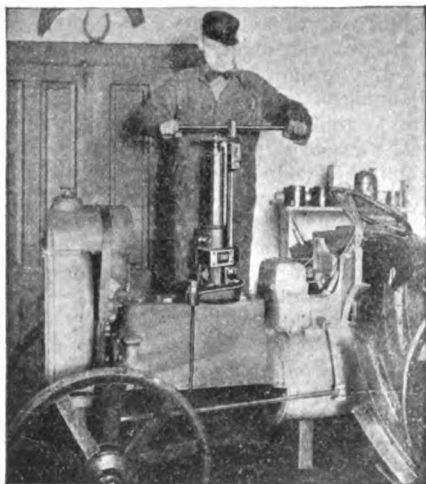
These record breaking trips also prove how an automobile can stand a long continued run without mechanical trouble. In this case the car was ready to start at once on a second trip.

# ACCESSORIES DEPARTMENT

**The Storm "Type M" Reboring Machine,** which is now being offered to the trade, possesses a number of unique features and advantages, making it admirably adapted to the needs of shops doing cylinder reboring of all kinds.

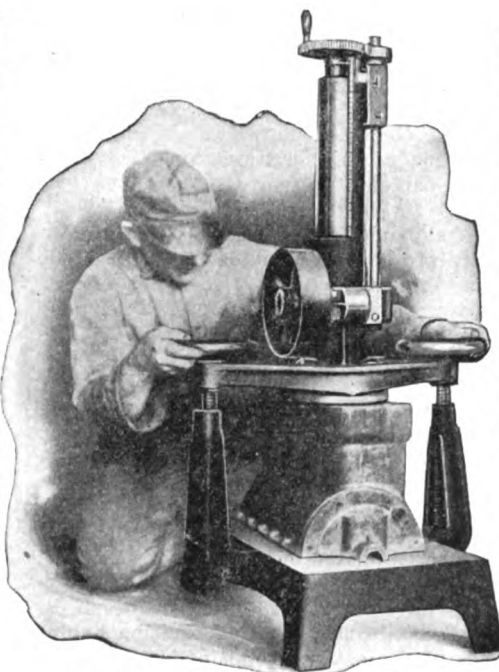
The main body is a one-piece, heavy casting and supports the boring bar, feeding and driving mechanism. The construction provides two heavy, adjustable bearings in which the boring bar operates. The boring bar is of hollow, carbon steel, hardened and ground, and having a travel of 14 inches. It is actuated by means of cut spiral gears and the feed is obtained through heavy, internal screw and upper feed gear, as shown in cut. The bar supports the cutter heads, which are not shown.

The cutter heads are of the well known Storm Patented Six-Cutter type, which have universal adjustment by means of a center cutter adjuster, so that they cut to any desired size within the capacity of the machine. The machine is supported by a heavy base provided with a clamp yoke and clamping screws. It rides or floats free in this clamp and is self-centering.



A valuable feature of this tool is its adaptability to different methods of drive. It is regularly furnished with a connection for a drill press, but can also be furnished with a pulley for belt or for motor drive. It will be noted that the machine does not set directly in front of or over the drill press base, but instead sets to one side, so that it does not interfere with the use of the drill press for other work. Furthermore, it is back geared so that it may be used with any ordinary 20-inch drill press.

On other types where the boring bar is driven directly from the drill press spindle, a back geared drill press only could be used, otherwise proper speed could not be obtained. Then, too, the combined



height of the block and machine does not interfere with its use under any ordinary drill press.

Each machine is also provided with a double-end wrench for operating by hand so that it may be removed from the base and used as illustrated for reboring motors without removing them from the chassis, by merely withdrawing two small pins in the clamping device.

The cut shows a Fordson block being rebored in this manner. Users find this very convenient not only for tractors, but for marine engines, trucks and passenger cars. The total capacity of the machine is from 3% to 6 1/2 inches, and its weight is approximately 300 pounds.

Manufactured by the Storm Manufacturing Co., Minneapolis, Minn. Prices and literature on application.

**The Gilman Shock Absorber.** In principle and operation, is claimed to afford the ideal method of shock absorption for motor vehicles, for it controls the spring's recoil the full distance of its travel. While permitting the springs to perform their intended function to the limit of their efficiency under normal road conditions, it prevents abrupt or violent movement when road conditions change from normal. Like the spring itself, it is placed between the body and the axle. It offers no restraint to the downward or contracting movement of the spring, but when road variations tend to provoke violent recoil, it smoothly checks such recoil at every stage.

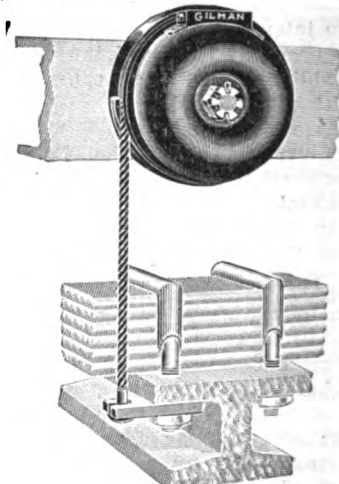
When the Gilman shock absorber is in

(When Writing to Advertisers, Please Mention the Automobile Journal.)

action, its friction belt band is adjusted to engage the circumference of the stationary friction drum. Any tendency of the body and the axle of the car to suddenly separate, because of the upward thrust of the vehicle springs, causes a sufficient tightening of the friction belt band upon the drum to counteract and retard this upward thrust. This result is accomplished by the frictional contact between the free end of the band and the drum and to the forward movement of the opposite end of the band by the rotation of the drum.

On the other hand, when body and axle approach each other, the tension of the flexible cable is released and the spring is permitted to exert its force in returning the body. Accompanying this action the friction between the free end of the friction belt and the stationary drum, cooperating with the reverse movement of the opposite end of the band, loosens the band sufficiently to allow the drum to be returned by the spring.

The tightening and release of the friction belt band are entirely automatic and instantaneous at the beginning of each forward or reverse movement of the drum.

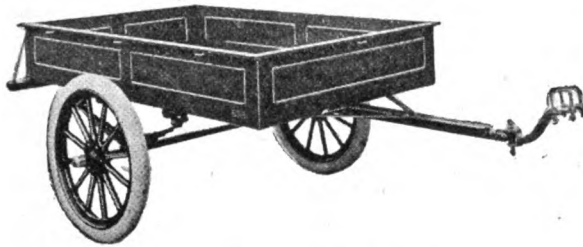


The gripping effect of the band on the drum can be increased or decreased as desired by means of a simple adjusting device near the top of the absorber. A few turns to the right of the small screw with a screw driver increases the tension; a few to the left decreases it. The main bearing of the device is self-oiling, as it is made of a wood impregnated with lubricant. It thus requires no attention.

The Gilman shock absorber is guaranteed by the maker to give absolute satisfaction or the purchase price will be refunded.

Manufactured by the Gilman-Davis Manufacturing Co., 224 South Michigan Avenue, Chicago, Ill. Literature and prices on application.

The Lyons Steel Trailer is illustrated herewith in two models, the A, the Lyons Thrifty, which is a simple type without top or side boards and the Model D, Lyons Favorite, which is equipped with wire side boards, giving it a finished effect and adding to its utility. They are designed for any kind of a load and to run on any kind of a road, and may be utilized for

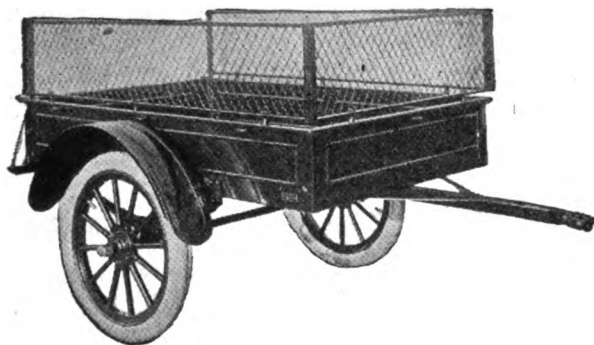


business, pleasure or sport. With it goods of all kinds may be delivered, its capacity being the same as that of a light delivery car. A contractor or workman can carry his tools or material to the field of operations. Baggage and camping outfits may be carried on the summer tour and a special type of bungalow camp trailer is made.

The Lyons trailer may be easily and quickly attached to any make of touring or passenger car without injury or disfigurement. It is stated to be sturdily built and beautifully finished; is strong enough to haul a piano or heavy express load.

The Lyons loading racks are made for all purposes.

The specifications are as follows: Steel body, 72-inch by 46-inch body, 12 inches deep, 30 by 3 wooden automobile wheels, ball bearings; 1 1/4-inch axle; 30 by 3 non-skid pneumatic tires, standard American make. Wood flooring with steel protect-



ing strips. High grade auto springs. 750 pounds capacity. Color, dark green body, black wheels and trimming.

Manufactured by F. P. Lyons, Inc., Manchester, N. H. Literature and prices on request.

Giant Grip Traction Equipment for motor trucks includes a standardized twin clamp that is stated to insure the vehicle against time lost through tie-ups due to mud, sand, snow or other bad going.

The device is extremely simple and consists of a twin hook and eye clamp of drop forged special analysis steel and a back plate bolted to the spokes at the felloe. Each clamp anchors two chains. The chains are carried in the tool box and when needed are hooked on in two minutes time. A patented connecting hook engages in the eyelet of the clamp, locking the chain securely.

The truck operator is enabled to attach the chain without tools and without jacking up the wheels—the clamps being left on permanently. The simplicity of the device saves time and makes removal of the chains so quick and easy that the

driver is not tempted to leave the chains on when not needed.

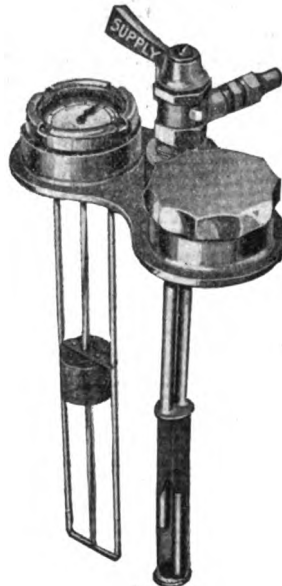
Giant grip twin clamps are made in three sizes, graduated according to tonnage to equip all trucks with wood wheels and solid tires.



Giant Grip Traction Equipment is proving particularly interesting to service stations, as they do not have to carry a large assortment. One size fits over 400 different makes of trucks. The company also manufactures equipment for all types of steel wheels.

Manufactured by the Giant Grip Manufacturing Co., Oshkosh, Wis. Prices and literature on request.

The Ideal Reserve Valve and Filler Neck is a new device assembled in one piece for use in connection with the vacuum system. When being supplied by a full tank of fuel this reserve valve feeds through the short tube, as shown in the



cut, until the supply has been consumed on this tube (regular supply), which will then refuse to feed the engine, but will leave a supply of gasoline in the tank to carry the car to a gasoline supply station by operating the reserve valve from supply to reserve, which permits the reserve fuel to be consumed. The reserve valve now being in operation the filler cap cannot be removed from the filler neck until the valve has been reversed to the regular supply.

The valve is made in such a manner that it is leak proof. It will be noted that it is so embodied in the assembly with the filler neck and gasoline gauge as to make an artistic assembly of three parts in one. This automatically eliminates a large portion of the expense in applying the device to the gasoline tank by making one opening in the tank instead of three, and the final operation of

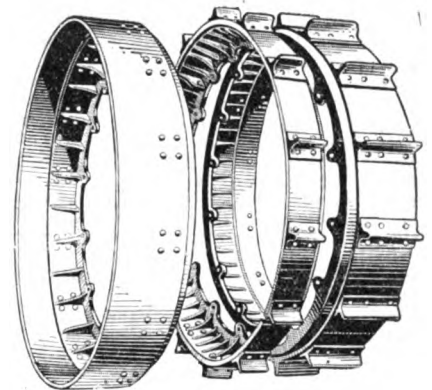
(When Writing to Advertisers, Please Mention the Automobile Journal.)

sweating or soldering one piece rather than three pieces.

The Ideal reserve valve is made entirely of brass, highly polished and nickel plated.

Manufactured by the Ideal Brass Works, Indianapolis, Ind. Price, complete, \$5.50.

Foley Traction Rims are being made in sizes and types adapted for quick attachment to or detachment from the rear or traction wheels of all motor trucks and tractors regardless of the make or type. The line includes traction rims for wheels using 32 by 4 1/2 inch and 33 by 5 inch pneumatic tires (which are intended for Ford trucks rear wheels using pneumatic tires), also the 35 by 5 inch pneumatic tire rim, and traction rims of different designs and types for use on truck wheels equipped with solid rubber tires. The standard type of rim is made so that the width conforms with the size tire on the wheel. For instance, the 32-inch rim is 2 1/4 inches wide overall, and the 36-inch



rim is 3 1/4 inch wide overall. Special rims are also made in various widths up to and including eight inches and are of double reinforced construction, made up from a combination of electric steel casting and boiler plate steel. This latter rim is designed in particular for the heavy duty trucks engaged in road building and similar work having to negotiate unusual unstable road conditions.

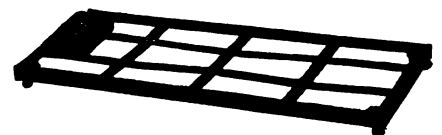
The Foley rims are guaranteed as to their construction and practicability and the many thousand now in use is unquestionable evidence of their merit. They are guaranteed to increase the traction efficiency of motor trucks anywhere from 200 to 300 per cent. when negotiating soft roads. They automatically come into action when a soft road is reached.

The maker is prepared to ship in quantities of one set of rims or in car load lots as the occasion requires.

Foley Traction Rims are fully covered by United States and foreign patents.

Manufactured by Foley Traction Rim Co., Inc., 1311 Hennepin Avenue, Minneapolis, Minn. Prices and literature on request.

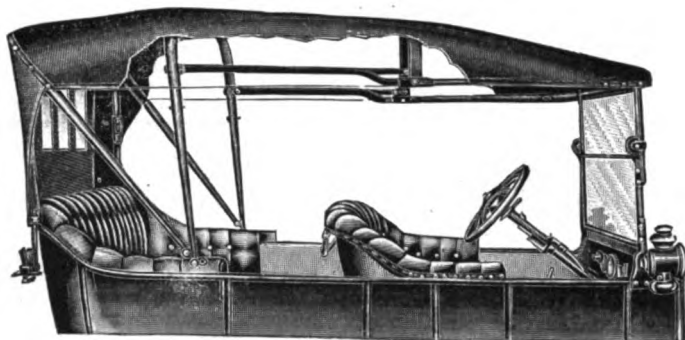
W-A All-Steel Creepers are designed to afford the most service at the least cost in repair shops and garages. They are stated to be well constructed of angle steel and steel bands so as not to fill with dirt, thus assuring a clean creeper at all



times. They are tested to 400 pounds capacity and will stand the roughest usage.

W-A creepers are 36 inches long, 15 inches wide and two inches high, have leatherette covered head rests and roller bearing casters. The shipping weight is 10 pounds.

Manufactured by J. H. Whetstone & Co., Lapeer, Mich. Price, \$4.



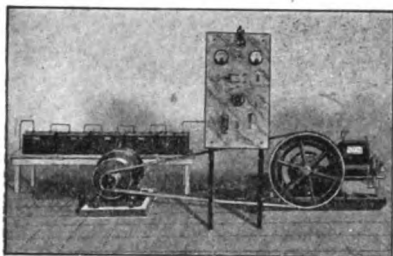
The Top Converter for Ford Cars has been developed by the manufacturer to supply Ford owners with a type of converter which quickly changes the old style top into a one-man type by simply removing the two front bows and substituting the bows and irons of the converter. With this device the top is fastened

to the top of the windshield as in the one-man top, while provision is made for raising and lowering the top equipped with the converter when desired.

Manufactured by the Precision Metal Workers, 3106 Carroll Avenue, Chicago, Ill.

The Main MCF Lighting and Charging Set is a new outfit recently added to the well known Main line, especially designed for lighting the suburban garage and also to supply equipment for the charging of automobile batteries. It consists of the Main MCF plant using a 600-watt, 40-volt, direct current generator, a 1½-horsepower gasoline belted engine and a 16-cell sealed glass jar type battery for the lighting of the garage and an extra panel on the switchboard for charging from one to 10 six or 12-volt batteries to automobiles at a time.

This equipment is of the same high quality of construction as is characteristic of the entire line of the Main Co.



By the use of the MCF plant any garage or repair man is absolutely independent of any outside source of current and is in a position to earn big returns on the investment, by the charging of storage batteries alone, the maker states, to say nothing of the convenience of having such an outfit available at all times.

Manufactured by the Main Electric Co., Cleveland, O. List price for complete plant, \$290.

The Duro Fuel Converter is a new attachment for the carburetors of Ford cars which, by heating the gasoline immediately before it is sprayed into the air stream, is able to effect economies in fuel consumption that should attract widespread attention in view of the present cost and low grade of motor gasoline.

Many inventions have been offered to the motorist for the saving of fuel, ranging from new carburetors of high price and complex construction, to simple attachments to the intake manifold whose sole function is to admit additional air to the mixture without passing it through the carburetor.

The Duro Fuel Converter is based on the principle that liquids become more fluid by heating them and on the assumption that low grade gasoline is less fluid than high grade. Its function is to reduce the viscosity of motor fuel in order that the pulverizing effect of the air stream through the carburetor shall result in a spray of the finest possible division. It is intended that the fuel in this condition: i. e., liquid, shall be carried to

the cylinder in order that the highest possible volumetric efficiency shall be obtained, while at the same time having so



great a fluid surface exposed to the air in which the fuel is entrained that the resultant heat due to compression and explosion shall vaporize completely and thus render available all the energy contained in the fuel at the proper time. It is obvious, therefore, that the heating of the fuel is merely intended to accomplish a fine division of spray and not intended to force vaporization, which would result in reduced volumetric efficiency.

At present the Duro Fuel Converter is being produced for attachment to Ford motors only, but the maker is preparing to equip many other standard makes of cars on which successful trials have been made.

Manufactured by the Duro Co., 96 North 15th street, East Orange, N. J. Information as to prices, etc., on request.

The Kant-Skore Alloy Piston has for its chief recommendation, according to the maker, that it affords relief from oil pumping through better compression under all conditions of motor temperature.

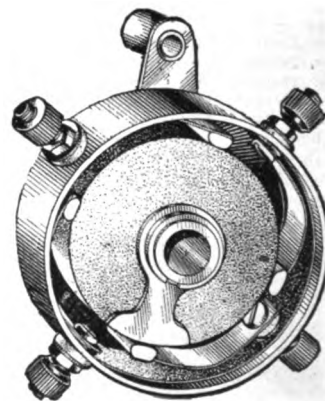


This piston has two V shaped spiral slots on opposite sides, which are intended to allow the piston metal to expand when heated, without increasing the diameter of the piston itself. The slots absorb the expansion. It is therefore claimed that since the piston requires the same clearance whether hot or cold, it can be fitted into the cylinder with not over .0001 to .0001½ clearance. This small clearance, in turn, is intended to stop the pumping of oil up into the cylinder head, loss of compression, or dilution of oil in the crank case through gas condensation. In addition the usual advantages of light weight pistons are claimed.

Kant-Skore Alloy Pistons can be furnished to fit practically every standard make of car, and each size and style has several over-sizes. They come already ground to fit the cylinder.

Manufactured by the Kant-Skore Piston Co., Buffalo, N. Y., which will supply complete information on request.

The U. & J. Timer is built on a principle that is new in timers, it is claimed, but that has been proven practical for years in electrical dynamos and generators—namely, the rotor principle. The rotor is the only moving part of the dynamo—similarly the rotor is the only moving part in the U. & J. Timer, there being no rollers. The rotor of the U. & J. Timer is made of specially prepared insulating material so hard, dense and



tough that it cannot gather moisture, it is stated.

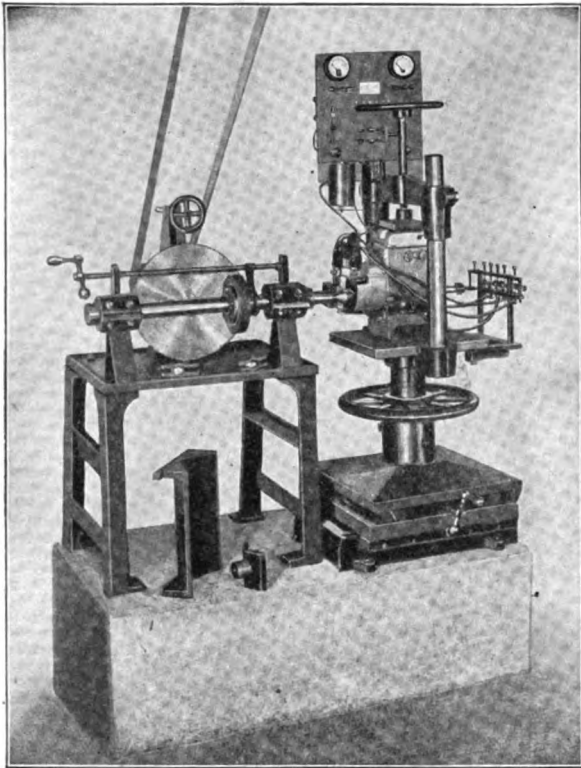
It, therefore, gives a clean wipe contact, insuring a hot spark to each plug, because the pressure exerted by the contact, determined in the design of the timer, remains uniform at all speeds. The result, the manufacturer states, is long life and perfect operation. With the U. & J. the roller is absolutely abandoned. The contact blocks are set on steel springs that exert a constant pressure. They cover the whole face of the rotor, making groove wear impossible. The springs are high tension and heat treated. They never lose their "spring" and "snap," it is claimed, even under excessive heat. Since the rotor is the only movable part revolving inside the contact blocks, all sediment falls into the base of the timer—centrifugal force throws all dirt or grease off the rotor, so that the timer cannot become clogged. The shell of the timer back of the contact blocks is lined with insulating material, making, it is claimed, short circuits impossible. The edges of the contact blocks are rounded, both front and back, so that a reversal of the motor cannot cause damage from back fire.

The timer is strong and heavily made throughout. The terminals are strong and tight and cannot loosen.

Manufactured and sold by the U. & J. Carburetor Co., 505 West Jackson Boulevard, Chicago, Ill. Installed on a 15-day trial and guaranteed to give perfect satisfaction. Retail price, \$2.50.

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The M. G. S. Testing Device for magnetos, electrical generators, electrical engines, starters and other dynamo machines is stated to be a proven success as, before applying for a patent, it was given severe tests on all kinds of work for which it is designed.

The machine is adapted to drive and test all kinds of electrical units which have been removed from their original driving means, making it possible to properly install new parts and know that they will give satisfactory service before installing them with the motor or other driving power from which they were originally removed. It is built with adjustable features to enable it to run from any permanent line shaft.

It will be noted that the entire machine is not complicated and any man familiar with automobile work should find it an easy matter to test any magneto, generator or starter with this equipment. There is no guess work, as the entire output of the generator is shown on the amperemeter on the switchboard facing the operator.

It is stated that the required time for testing the average generator with this machine should not exceed 15 minutes, and that a magneto can be satisfactorily tried out in less than 10 minutes. If any one of the leads is defective it will be shown in the sparking gap, and as a plurality of sparking gaps are provided, it enables a number of cylinders to be tested just as rapidly as one.

The machine is equipped with a V-shape clamping arrangement, which insures a positive holding position for any style of generator or magneto, and it is unnecessary to remove the drive gear or other couplings from the electrical units being tested. It is also provided with a set of flexible drive couplings, which adjust themselves to any shaft or driven coupling, as they have a long range of adjustments.

When operated according to instructions furnished, this device is guaranteed for a lifetime against poor workmanship and material.

The illustration shows the testing generator coil and distributor, with a Delco generator with distributor and coil being tested, all in one operation.

Manufactured by Klemmer Brothers & Co., 128 West Bridge Street, Owatonna, Minn. Particulars and prices at request.

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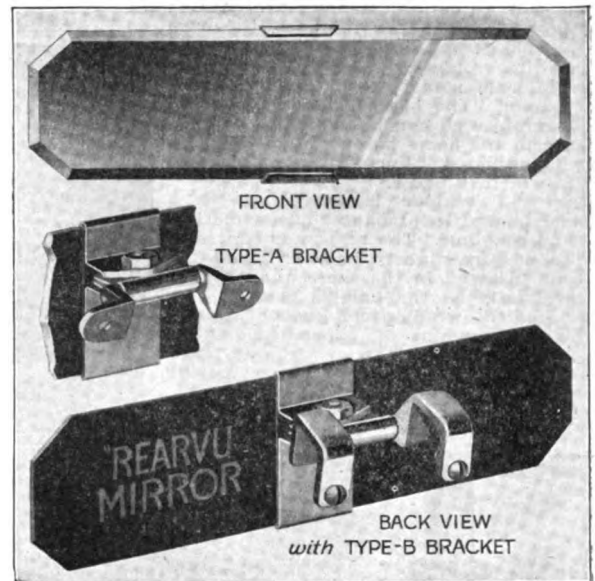
The Universal One-Piece Piston Ring is stated to have unusual merit for keeping down oil, minimizing carbon troubles, giving increased power, which in turn gives decreased gasoline and oil consumption per mile, and it was recently placed on a popular price basis.

Universal One-Piece Piston Rings have an outer and inner circumferential groove which gives a forced lubricating feature to the cylinder walls. All rings are placed on the piston with the grooves up, and the excess oil is collected on top and when compression starts this excess oil is started downward by being collected in the upper groove, and as compression increases it is forced on into the inner groove, giving a perfect seal to the motor; when firing takes place the excess oil is down and away from the firing cham-



ber and, as the piston goes down after firing, the oil that is packed in the inner groove lubricates the side walls of the cylinders, which gives a forced lubrication at all times to the cylinder walls. The oil sealing feature of the ring is claimed to give as near perfect compression as is possible and, by starting the oil downward on the compression stroke, the oil is kept away from the firing chamber, which practically eliminates carbon trouble and gives a minimum amount of engine trouble from this source, with increased mileage per gallon of gasoline and a decreased consumption of gasoline and oil per mile.

Manufactured by the Universal Machine Co., Industrial building, Baltimore, Md. Literature and prices on request.



The Auto Rearview Mirror reflects clearly road conditions in the rear, enabling the driver to keep his eyes ahead. It can be instantly adjusted to the position most convenient for the individual driver with the windshield open or closed.

The assembly of the Rearview mirror is very simple. But one nut and screw is used. Along with this simplicity is a construction that is claimed to positively eliminate vibration, and there is no undue strain on the glass. The metal assembly is of spring brass and bronze, which will retain their original luster and will not rust. The mirror is of the highest grade of beveled French plate, size 2 1/4 by 10 inches. The brackets are of heavy brass, nickel plated, and sufficiently rigid to avoid vibration. The windshield may be opened for ventilation and other purposes without changing the position of the mirror.

Made in two types: A for closed cars; B, for open.

Manufactured by Automotive Accessories, Inc., Kokomo, Ind. Exclusive sales representative, Fulton Co., Milwaukee, Wis. Price, each, \$3.50. Packed in individual cartons, 25 to the standard shipping package.

The Prest-O-Grip All Unit Chain has been designed especially for steel spoke wheels and this type of chain and fastening device is especially adapted for steel spoke wheels that cannot be fitted with a regular spoke clamp, particularly on the dual tire type.

Particular stress is laid upon the fact that they can fit practically any type of



motor truck wheel equipped with either solid or giant pneumatic cord tires.

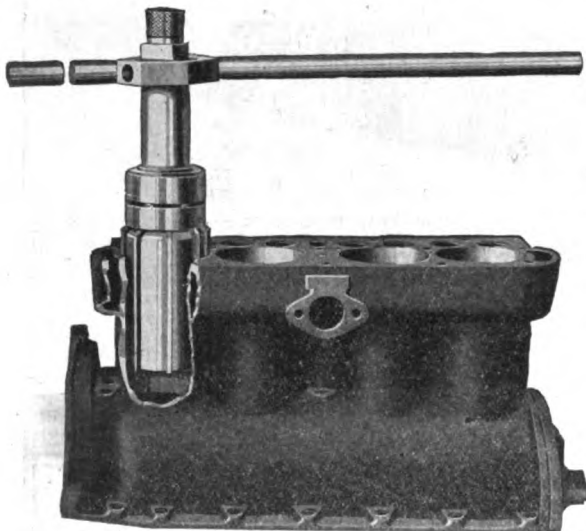
Special fasteners are used which hold the chains securely on the wheel and allow plenty of slack to prevent them from cutting into the tires.

Manufactured by the Rowe Calk & Chain Co., Plantsville, Conn. Literature and prices on request.

The F-J Adjustable Reamer presents as one of its outstanding features, the ease with which it can be adjusted to any size within its range by simply turning the knurled head screw at the shank end of the reamer. The blades, which move absolutely parallel, can be expanded or contracted in the same manner as a micrometer is adjusted. For sizing a hole this feature is invaluable.

The F-J reamer is stated to be a pioneer in that it introduces a new method of hand reaming. The reamer is contracted to a size slightly smaller than the hole, is inserted in the same and expanded gradually as the hole is reamed. By means of the graduations on the knurled screw the amount of expansion can be read off very accurately.

The cut shows the cylinder reamer in



place in the first cylinder of a block. The reamer is inserted in the cylinder far enough to leave the top end of the blades about an inch above the top of the block. The blades are expanded until the edges just take hold in the cylinder walls and then about .0015 to .002 of an inch more for the cut. The cylinder is then reamed through by using the wrench as shown in the illustration. The blades are contracted, the reamer brought back to the starting position, expanded for the second cut and the former operation repeated. For the final finishing and sizing cuts the feed should only be about .0005 or .001 of an inch.

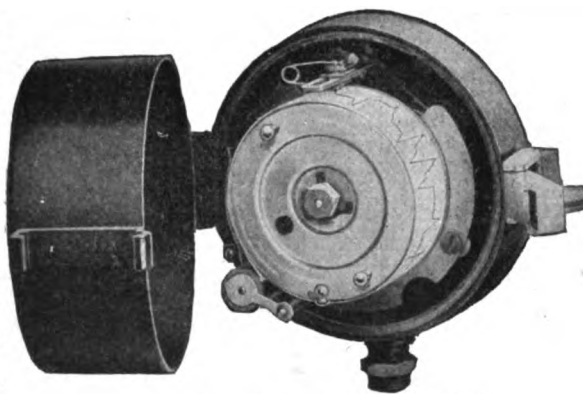
Complete instructions as to the use of the reamer and method of sharpening the blades, etc., are furnished with the tool, or the maker of the equipment will regrind the blades at a small cost.

Manufactured by the Foster-Johnson Reamer Co., 1002 Beardsley Avenue, Elkhart, Ind. Prices on request.

The Recordograf, an instrument giving forth on a paper tape a graphic record showing all the time, distance, speed and stops of the motor vehicle to which it is attached, is presented in its refined form after 15 years constant and successful operation on diversified motor equipment ranging from light runabouts to huge motor trucks.

It is simple, accurate and tamper proof and the indelible record it writes of each movement or stop of the car permits of a detailed analysis of the vehicle's operation.

The instrument consists of three essential parts, the clock, the recording device and the pencil mechanism. The clock, the manufacturer's own design, is of unusually heavy construction and is not in any way affected by vibration. The recording mechanism, which is driven by the flexible shaft, is merely a worm shaft driving a worm wheel; this in turn rotates an eccentric cam. The pencil mechanism is actuated by the eccentric cam and travels in a guide way.



The tape is run from the tape holder and threaded into the clock drum. The combination of clock, recording mechanism and pencil mechanism produces on the tape a clear, mechanically accurate record of time, distance, speed and stops. Each tape is 36 hours long, divided and marked in hourly periods beginning at 4 p. m. and running 36 hours to 4 a. m. The a. m. hours are denoted by a light margin at the top and bottom of the tape. The hour is sub-divided into five-minute periods by small squares. A horizontal line marked by the pencil denotes that the vehicle remained stationary five minutes for each square through which it travelled. When the vehicle moves the pencil travels obliquely on the tape. The tape is eight squares wide, representing two miles of travel; each square thus stands for a one-quarter of a mile. It will be evident, therefore, that the speed of the vehicle is graphically shown by the angle of the oblique line. For example, if the oblique line entirely crosses the tape eight squares in 10 minutes, it would indicate that the vehicle had travelled two miles in that time, or at a rate of 12 miles an hour.

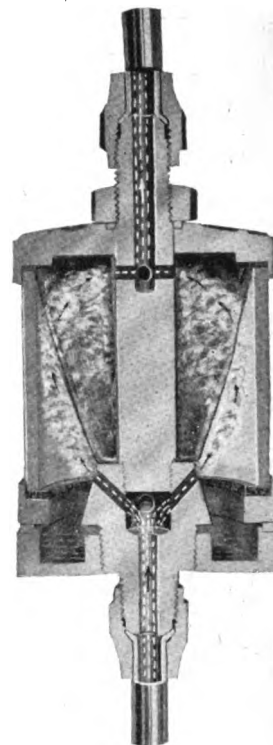
The transmission consists of a simple but effective collar fastened to the inside front spokes. This rotates a star wheel, which in turn operates the flexible shaft. The speed of this shaft ranges from only 58 to 62 revolutions a mile as against 1000 or 1500 revolutions of an ordinary speedometer.

The company also manufactures the Ford and Dreadnaught types of hubodometer which record the accumulated mileage covered, both backwards and forwards. These require no mechanical work for their installation, being simply screwed or bolted on to the hub like a hub cap.

Manufactured by the American Taximeter Co., home office, Broadway at 61st street, New York city, with branches in all principal cities. Prices: Recordograf, complete with 100 tapes and speed scale to ascertain rate of speed, \$65 f. o. b. New York. Installation will be made at any of the company's service stations at small additional cost. Ford type Hubodometer, \$17; Dreadnaught type, \$20.

The Ro-Gas-Filter is claimed to be one of the most effective devices of its type on the market in that it positively removes all the dirt and water from the gasoline. It is a small instrument, made from brass, with a glass cylinder, inside of which is a chamolite filter held taut and in shape by a wire frame. The flow of gas is from the bottom up, the refuse remaining outside and below the cone shaped chamolite.

It may be attached anywhere on the gasoline feed line between the tank and the carburetor. This is easily done in a



few minutes time without special tools and it is adaptable for use on any car whatever feed system may be employed.

Directions for attaching: Cut about four inches from the feed line, slide the compression nuts on to each end of the tube and, with any convenient instrument, roll the end of the tube into a slight bell shape. This should give a tight connection without the use of solder or other device. The Ro-Gas-Filter is simply put into place and the compression nuts tightened. Care should be taken that the filter is in an upright position. If by chance the nuts furnished should not fit the tubing they may be returned to the manufacturer together with the name of the car and they will be replaced with a set that will fit.

Manufactured by the Roll Manufacturing Co., Fond du Lac, Wis. Price, \$6.

Gill Piston Rings are made from single piece castings of special grey iron and machined accurately. They are self-fitting, one-piece rings of sturdy construction, having a distinctive joint which forms a seal that prevents the passage of gas or the pumping of oil from the cylinder walls into the combustion chamber.

Gill rings are guaranteed to increase power, prevent smoking resulting from oil suction, to overcome excessive carbon trouble, and to reduce gasoline and oil

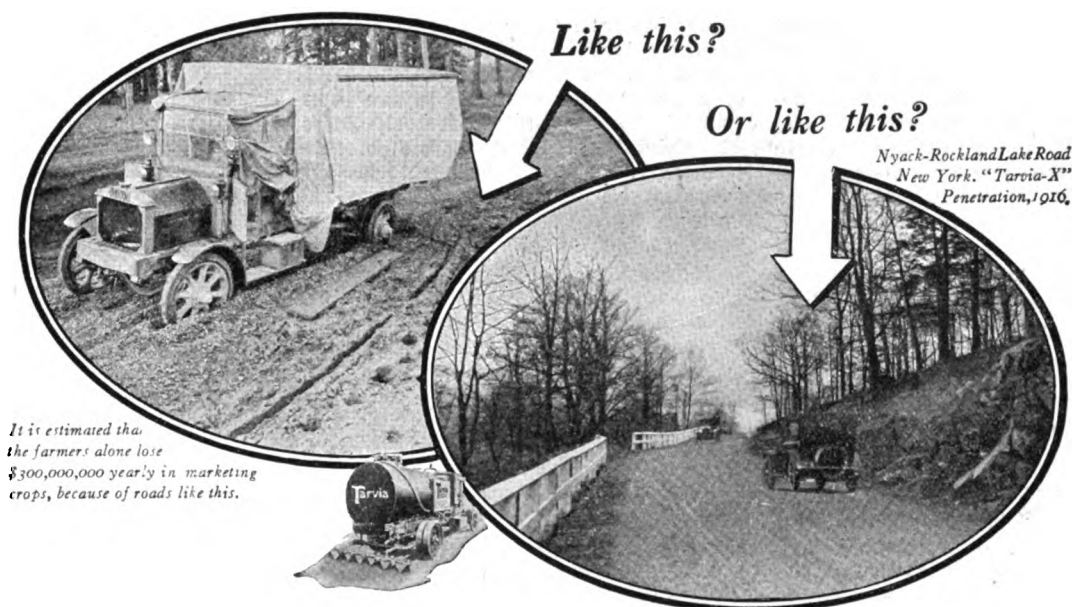


consumption. When the engine is fully equipped with Gill Piston Rings the company states that it will refund the full purchase price upon return of the rings if they fail to meet this guarantee. This guarantee does not cover rings used in scored or out-of-round cylinders until they have been reground.

They are made in all sizes to replace the rings in all types of motor trucks and tractor engines.

Manufactured by the Gill Manufacturing Co., 83rd Street and Jeffery Avenue, Chicago, Ill. Literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



## How Did Your Roads Come Through the Winter?

THE annual Spring thaw is the "Water-loo" of thousands of miles of road throughout the country. For weeks in the Spring, when the frost is coming out of the ground, they are swamps of sodden mud—often impassable—always hard going.

To spend money year after year on unimproved roads, is to send good money after bad. For, at best, such roads are hopelessly inadequate for present-day traffic.

Look at the Tarvia road at the right. Isn't that the sort of road you need? A road that is dustless, mudless, frost-proof and traffic-proof 365 days in the year? Good roads like that are not expensive. They are within the reach of every community.

Let us send you facts, figures and pictures of some Tarvia roads near you—roads that have come through the freezes and thaws, the rains and the snows of winter, smooth and firm—all ready for the heavy summer traffic.

Tarvia is a coal-tar preparation for use in building new roads and repairing old ones. It reinforces the road surface and makes it not only dustless and mudless, but waterproof, frost-proof and automobile-proof. Where the existing macadam or gravel road can be used as a base, the cost of a traffic-proof Tarvia top is extremely low.

*Illustrated booklets free on request.*

# Tarvia

*Preserves Roads - Prevents Dust*

THE BARRETT COMPANY, Limited:

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Detroit  
Sub Lake City  
Johnstown  
Elizabeth

Chicago  
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Seattle  
Lebanon  
Buffalo

Philadelphia  
Birmingham  
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Baltimore

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The Barrett Company

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St. Louis  
Minneapolis  
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Houston

Cincinnati  
Nashville  
Bangor  
Lafayette  
Denver

Pittsburgh  
Syracuse  
Washington  
Baltimore

### Special Service Department

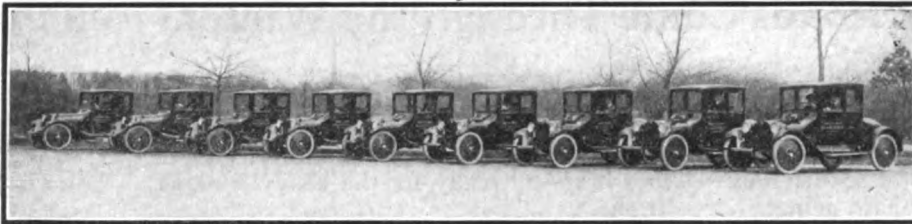
In order to bring the facts before taxpayers as well as road authorities, The Barrett Company has organized a Special Service Department, which keeps up to the minute on all road problems. If you will write to the nearest office regarding road conditions or problems in your vicinity, the matter will have the prompt attention of experienced engineers. This service is free for the asking. If you want better roads and lower taxes, this Department can greatly assist you.

### PATTERSON-WARNER ACQUIRES INTEREST IN AUTO INDICATOR.

It is announced that E. C. Patterson, president of the Patterson-Warner Co. of Chicago has acquired an interest in the Auto Indicator Co. of Grand Rapids, Mich., and has been made a director in the company. Mr. Patterson is a national figure in the automobile field. He has been one of the foremost automobile racing patrons of America, his cars having been piloted to victory by De Palma, Chevrolet and other noted drivers. He holds individually the long distance return trip record for a run between New York and Chicago.

About four years ago he organized the Patterson-Warner Co., associating with himself A. P. Warner of Beloit, Wis., originator of the Warner Speedometer, in the manufacture and sale of the Warner-Lenz.

Mr. Patterson has been investigating a rear signalling device for automobiles for some time, realizing that there was a tremendous potential demand for a device that would be adequate. His investigating finally led to a connection with the Auto Indicator Co. of this city, and this implies the recapitalization of the company on a basis that will provide for a world wide business.



Fleet of Dodge Coupes Used by Salesmen of Walitt & Bond, Inc., Newark, N. J., Maker of Blackstone Cigars. Photograph Was Taken During Formal Parade of Salesmen from Newark to Boston, March 21-25. Cars Are Conspicuous on Account of Their Equipment of Orange-Colored Disc Wheels and Gold Bands on Doors.

The increase in the capital stock to \$1,500,000 has already been provided for.

The present Auto Indicator is a development of the signal originally manufactured by the Auto Indicator company, of which about 35,000 have been sold. The present device, however, is a very great improvement over any previous models. The action of the Auto Indicator is purely mechanical, the stop signal being flashed automatically upon the pressure being applied to the foot brake; the right and left turns being indicated by a lever conveniently situated on the steering wheel. All three operations giving notice of intended change of speed or direction; and being as automatic with the driver as the steering of the car.

The company will continue to manufacture in Grand Rapids. The board of directors has been increased from five to seven, the other new director besides Mr. Patterson being C. B. Hamilton of the Brearly-Hamilton Co. of Grand Rapids.

The officers of the company are: President, Joseph Renihen; vice president, R. W. Brown; secretary-treasurer, V. T. Cilley.

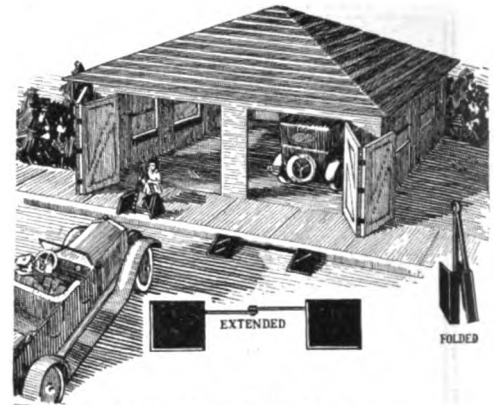
A shrinkage of \$67,700,000 in American exports took place in January.

### Protective Committee for Willys Corp.

The Willys Corporation, which has been known as a holding corporation, having 27 per cent. of the stock of the Willys-Overland Co., as well as stock of the Fisk Rubber and Federal Rubber companies, has been placed in the hands of a protective committee in the interests of the first preferred stockholders. The Columbia Trust Co. is the chief depository and the sub-depositories are the First National bank of Boston, the Central Trust Co. of Illinois and the Girard Trust Co. of Philadelphia.

The members of the protective committee are Howard Bayne, chairman; U. N. Bethell, Stedman Butterick, Thomas B. Gannett, Robert E. Hunter, Leclanche Moen, Robert L. Montgomery, Joseph P. Cotton, counsel, and Willard C. Mason, secretary.

The Willys Corporation was incorporated July 24, 1917, in Delaware as the Electric Auto-Lite Corporation and its present name was adopted in September, 1919. In that year the company acquired the capital stock of the New Process Gear Corporation and the Duesenberg Motors Corporation.



Kurb-Kumfort Portable Runway.

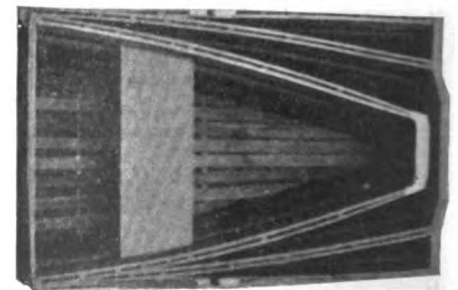
many who, because of municipal laws or from fear of theft, wish to keep their runways out of the gutter and safe in the garage. The Kurb-Kumfort is much easier to handle than wooden blocks or built up runs. It is clean in muddy weather and one trip places both runs in the street.

Kurb-Kumforts are made in all sizes to fit any height of curbing. They sell for \$3.50 a pair and can be obtained from most dealers, or by writing Arnold & Co., 11 Arch street, Providence, R. I. The height at the curb should be stated when ordering.

### DARROW'S SECTIONAL BOATS.

As the outing season is at hand it is timely to call attention to the products of the F. H. Darrow Steel Boat Co., Albion, Mich., which specializes in the manufacture of steel boats, boat patterns, plans for construction and sportsmen's equipment. The illustration shows a Darrow sectional boat which should make a particular appeal to autoists who require a boat on their outings or vacation trips. This is stated to be one of the most practicable portable boats on the market. It is light, durable and safe, is built of the best grades of galvanized steel and reinforced with clear oak or cypress. It is of the float bottom, flaring side style and is stated to be very steady in the water.

Each section is a complete boat in itself and the sections nest together when the boat is being transported. A 12-foot boat thus nests in a space 50 inches long and 40 inches wide. It can be carried with safety and convenience on the running board of any make of automobile. The sections may be joined in five minutes without the aid of special tools.



Darrow's Sectional Boat for Autoists, Showing Method of Nesting to Save Space in Transportation.

### CORRECTION ON DORT COMPO-NENTS.

Through a confusion of specifications the Dort Model 17 line of passenger cars was mentioned in the March issue of The Automobile Journal by the 1920 model number 15. It was also stated that the equipment included a Stewart carburetor and Northeast ignition, whereas the Carter carburetor and Connecticut ignition, which have given satisfaction for so many years, are retained in the 1921 Model 17 line.

### KURBKUMFORT PORTABLE RUNWAY.

The Kurb-Kumfort is a portable runway designed to eliminate the expense of grading and recurbing. It is strong enough to hold the heaviest automobile, but light enough for a child to carry. It consists of two wooden runs connected so as to fold together when not in use. When folded it is easy to carry and to store; when extended the runs are just the right distance apart for the wheels of the automobile; there is no adjusting afterwards.

The Kurb-Kumfort fills the need of



## Factory and Salesroom on Wheels

A complete root beer manufacturing and selling unit, mounted on a 3½-ton Selden truck, has been purchased for service with the Ringling Bros. circus. Other units will soon be working with other circuses throughout the country. Transporting the big barrels and other paraphernalia around is quite a job, so an outfit was designed to be carried on a motor truck.

The first outfit was mounted on a 3½-ton Selden, which is manufactured by the Selden Truck Corporation, Rochester, N. Y. The Richardson company holds all patents in connection with this outfit.

This truck will carry the outfit around with the circuses and is complete in every detail. Syrup and water are carried in large tanks, two self-mixers are operated by electric motor and properly mix the ingredients, the beer running into two large barrels. These barrels are really coolers and have such a capacity for cooling that the liquid would be cold even though the five spigots were to be opened continually.

The arrangements for drawing the beer, plumbing fixtures and washing pockets

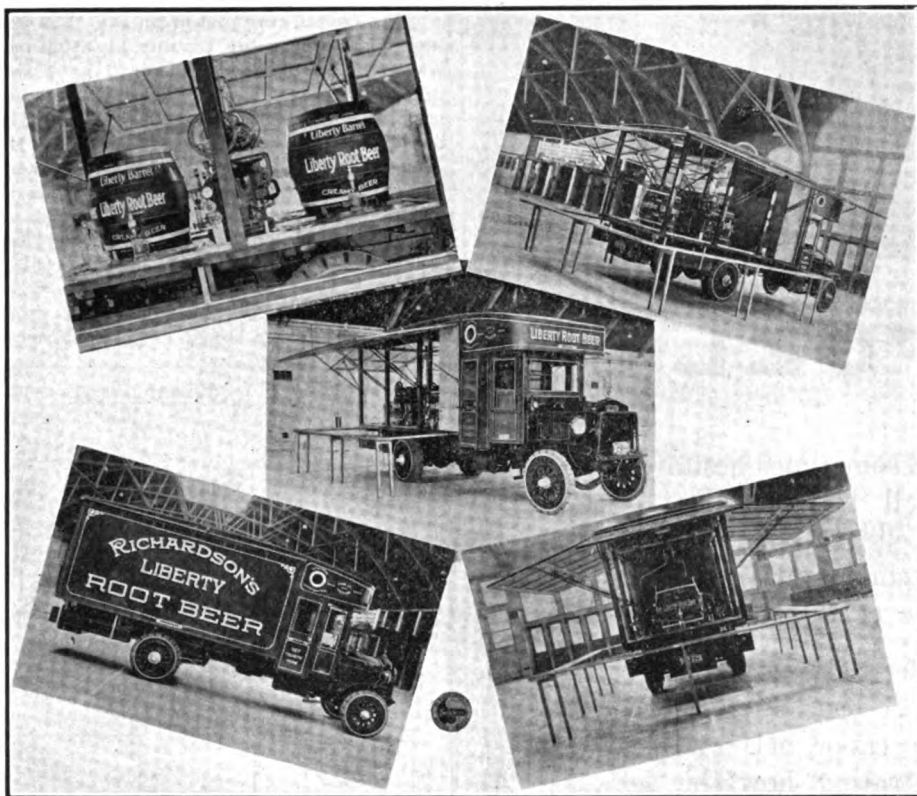
are exactly the same as at the best fountains. The outfit will make up 500 gallons of root beer with one filling. Electric lights and power are provided by auxiliary power plant, operated by gasoline. Even with the machine in full operation very little vibration is felt.

Two ticket windows are provided at the front, one on each side, as the outfit can be worked from both sides. The driver's seat folds up and provides com-

fortable padded seats for the cashiers who operate the very latest electric cash register and ticket seller. The counter reaching around the truck can be folded up and packed in long boxes carried under the truck.

The compartment over the driver's seat has a port hole and is equipped with a mattress and bed clothing. It makes a very comfortable sleeping quarter for three. The seat itself will provide a third bed room. This is one of the most compact and finest designed trucks ever completed for any kind of work and it is estimated by the Richardson company that it will pay for itself in a very short time in profits accruing from the sale of the root beer.

There are many other features to this truck. Next circus you visit look for one, for the Richardson company believes it will have similar outfits with every circus this summer. A smaller one-barrel outfit is being prepared for the small circuses. The Selden truck was chosen for a number of reasons, among which are its known reliability and certainty of securing parts wherever truck might be working.



Five Views of the Root Beer Factory and Salesroom on Selden Chassis Which Is a Money Making Medium for Ringling Bros. Circus.

# TRADE OUTLET

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POPE, PACKARDS, PIERCE, BUICK, STEVENS-DURYEA, KNOX, OVERLAND, ETC.

Motors.	\$25.00 up	Presto Tanks.	\$4.50 up
Magnetos.	4.00 up	New Spotlights.	2.00 up
Carburetors.	3.00 up	Generators.	10.00 up
Rear Axles.	15.00 up	Gears.	1.00 up
Front Axles.	5.00 up	Bearings.	1.00 up
Cylinders.	5.00 up	Radiators.	10.00 up

\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

## BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

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Adapted for automobile use, in ¼ lb. and 1 lb. cotton bags and paper cartons. SOFT, CLEAN, WHITE COTTON WASTE.

Assorted wiping rags—New, clean sanitary. Sample on request.

STANDARD WASTE & RAG CO.  
558 W. 51st St. N. Y. C.

SPECIAL LOT TIRES FOR SALE—Knight, Fabric, S. S., Ribbed, 32x4½, 34x4½. Blackstone, Fabric, Clincher, Non-Skid, 32x3½, 31x4. All with serial numbers, in original wrappers. Prices on application. Northern Trading Corp., 515 Broadway, N. Y. C.

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50% to 90% Off List.

24 Hour Service. Unlimited Stock.  
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Motors.	\$20.00 up	E. Presto Tanks.	\$4.00
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Cylinders.	\$3.00 up	Bearings.	50c up
Springs.	\$1.00 up	Rims.	\$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here.

Write Us—We Have It.

## Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

BUY USED FORDS AND MAKE ABOUT \$100 a piece equipping them with snappy FEDERAL SPEEDSTER bodies. Easy quick sales. Write at once for particulars. Federal Motor Supply Co., 2630 S. Michigan Ave., Chicago.

AUTOISTS, DEALERS—A transparent celluloid cement. Mends side curtain lights equal to new. Waterproof. Satisfaction guaranteed. Mends anything celluloid. 50 cents post paid. Special price to dealers. De-Ho-Ve Specialties, Station L, 40-M, New York City.

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## FUEL

WE sometimes hesitate to tell the actual facts about Zenith economy for fear our statements may be viewed as mere exaggerated claims.

We prefer to convince you by the direct testimony of other Zenith users or, better still, by demonstrating how the self-adjusting Zenith Carburetor on your own car or truck will lower your fuel consumption.

### Zenith Carburetor Co.

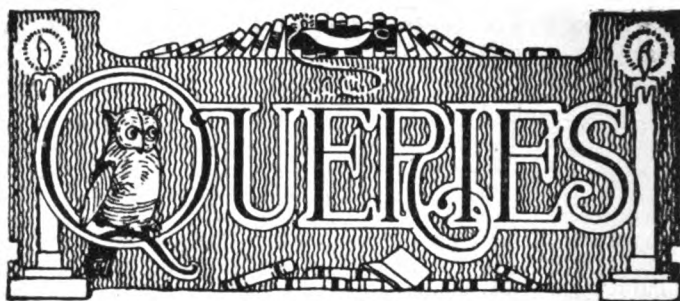
New York  
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### CARBURETOR PISTON STICKS.

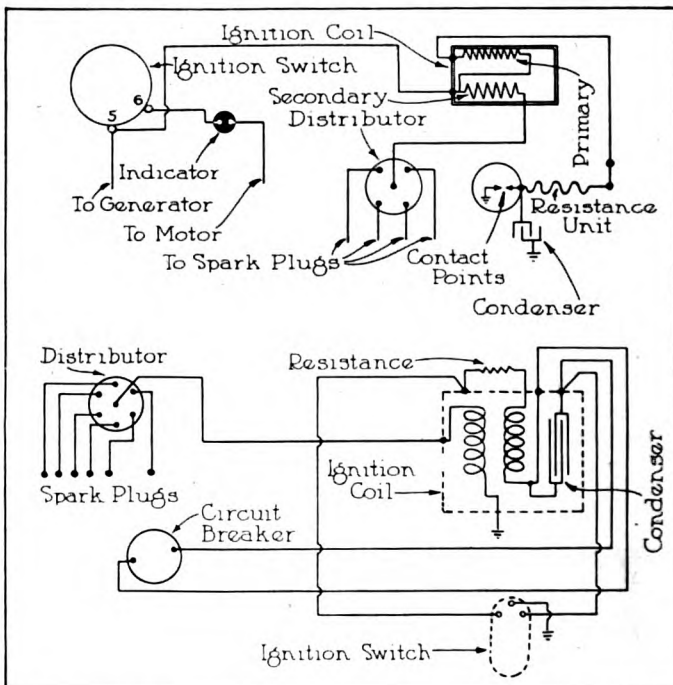
(A. G., New York City.)

The carburetor piston on my 1920 Essex car has been giving me considerable trouble by sticking and refusing to act when the throttle is opened. I have removed the piston and polished it, but it still sticks, so removed it again and sandpapered it with fine sandpaper. Even this did not remedy the defect. Kindly tell me how to remedy this trouble.

On several small cars I have noticed that there are five leads from the coil, while still others have three and some four leads. What is the reason for the additional wires?

How can I overcome a squeak in the brakes of a Winton 25?

The proper method to follow in remedying the piston trouble with your Essex carburetor, which you mention, is to



Upper Diagram, Essex 1920 Coil Having Three Coil Leads, Delco System. Lower Diagram, Oakland 32, Six-Cylinder Car, Using Remy System with Four Leads and Ground to Coil.

remove the piston and smooth it down with crocus cloth, which will remove the roughness left by the sandpaper and impart a smooth, bright finish, which should make the piston work freely in the carburetor cylinder. This defect is caused usually by back-firing into the carburetor and the piston may require removal at infrequent intervals and smoothing down with the crocus cloth.

The use of five leads instead of three in coils connected with the ignition circuit of an automobile engine is customary in certain makes of coil units, while in others four and, in many cases, three are used. The reason for this is that coils in early cars did not use the car frame as a ground, but employed a wire to complete the circuits of the primary current and in this manner more wires were needed. With the adoption of the grounded circuits in later cars, two of the wires were done away with, leaving three wires to convey the current and depending on the ground to complete the various circuits of the coil.

We do not know to what cars you refer as using five leads from the coil, but we find that the Remy coil did use a coil having five leads, but in later units this has been changed and four are now used. The coil is grounded to the frame, at the end of the high-tension winding, while the other end leads to the center of the distributor cap. The primary circuit is handled by a wire which leads from one side of the ignition switch to a terminal on the coil connecting with the primary winding, the current passing through the winding to the lower end, where it is divided, part of the current passing into the condenser and to a terminal at the top of the coil. Two wires lead from this terminal, one to the breaker points and the second back to a point on the ignition switch. The main wire from the primary coil is led to a center terminal on the top of the coil and a wire leads from the terminal to the opposite side of the breaker points. This places the condenser between the breaker points and prevents their arcing and burning when the flow of the primary current is interrupted. A resistance unit is located on top of the coil through which the primary current passes before entering the primary winding. This type of coil uses five leads from the coil.

The Delco system used on the Essex car of 1920 uses three leads from the ignition coil, one wire conducting the positive primary current from the switch to the terminal on the coil. From the terminal the current entering the coil is split and passes through the primary winding to the second terminal on the end of the coil, a short wire leading it to the resistance unit, to ground and to the timing contacts of the breaker box under the distributor. This current is also passed through a condenser connected between the contact points, which prevent burning and pitting of the points. So that the same results are obtained with this system using three wires as in the Remy system using five wires.

To overcome the squeaking in the brakes of your Winton 25 car we would advise that you experiment with other makes of relining bands.

#### FITTING PISTONS TO ENGINE CYLINDERS.

(G. G., Utica, N. Y.)

Where can I buy expanding reamers with a range of at least 1/32 inch? Where can I buy piston castings unfinished? How shall I fit pistons to engine cylinders and what allowance is made for expansion? What steel is best for wristpins and for axles? Should there be end play in a crankshaft? If so, will it cause a knock?

Expanding reamers are manufactured by Cleveland Twist Drill Co., Lakeside avenue and 49th street, Cleveland, O.; Cutter & Wood Supply Co., 70 Pearl street, Boston, Mass.; Gisholt Machine Co., Madison, Wis.; Keystone Reamer Co., 180 West Market street, Chicago, Ill.; Remington Tool Co., 88 Broad street, Boston, Mass.; Western Reamer Co., Milwaukee, Wis. Numerous other concerns make adjustable reamers.

You can purchase piston castings and fit them to engine blocks, but the work necessary in turning and finishing them would cost more and would probably be less productive from a business viewpoint than buying pistons of the sizes required and fitting them with rings and inserting them in cylinders when reboring as the means of restoration.

The following can supply pistons finished: Aluminum Manufacturers, Inc., 6206 Carnegie avenue, Cleveland, O. (lynite); Automotive Products Corporation, Holly and N. Pine streets, Hazelton, Pa.; Butler Manufacturing Co., 1124 E. Georgia street, Indianapolis, Ind.; Commerce Steel Products Co., 721 Otis building, Chicago, Ill.; Interstate Foundry Co., E. 61st street and Roland avenue, Cleveland, O.; Manufacturers' Foundry Co., Waterbury, Conn.; Newark Motor Products Manufacturing Co., Newark, N. J.; Trindl Co., 2917-21 S. Wabash avenue, Chicago, Ill.; Perfection Auto Parts Co., 408 Lakeside avenue, N. W., Cleveland, O. These concerns also manufacture piston pins. They produce stock sizes and special sizes to specification.

Cylinder reboring machines are made by Hinchley-Meyers Co., 1704 Tower building, Chicago, Ill.; Marvel Machinery Co., Loan & Trust building, Minneapolis, Minn.; Michigan Machine Co., 85 Porter street, Detroit, Mich., and Universal Tool Co., 435 Woodward avenue, Detroit, Mich.

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*Little did Bartholdi, the sculptor who conceived the Statue of Liberty, imagine that it would serve as a guide for airships as well as steamships! The famous statue is a striking landmark for aviators.*

**T**HE manufacturers of Socony Gasoline were already refining petroleum when the French government presented the Statue of Liberty to this country in 1876.

Socony Gasoline is straight-distilled, pure and always uniform wherever and whenever you buy it. Because of this, thousands of New England and New York State motorists use Socony exclusively. Its consistent quality means much in satisfaction and economy.

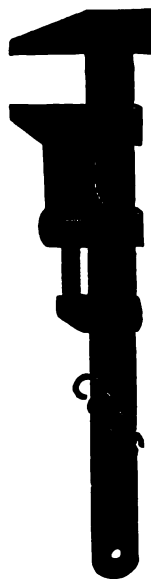
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REG. U.S. PAT. OFF.  
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*"Every Gallon  
the Same"*

# COES *The Standard WRENCH*



**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

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## WANTED!

10,000 Automobile Owners and Dealers who like to fish or hunt. Carry your boat with you and make sure that your Outing is not spoiled by a leaky boat or no boat at all.



We build six styles of sectional boats. Twenty-five sizes. All are portable by Automobile. Guaranteed safe, practical and durable. Complete information and prices mailed on request.

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## TRACTOR WORLD

Monthly 20c the Copy \$2 the Year

A Tractor Journal devoted to the tractor industry and trade

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PAWTUCKET, RHODE ISLAND

In fitting pistons to cylinders the usual allowance is not less than  $4/100$  at the bottom of the skirt, and increasing to from  $7/1000$  to  $10/1000$  at the top, each "land" being  $1/1000$  larger from the top to the bottom. A safe rule with cast iron pistons is to allow  $3/1000$  inch for every inch of cylinder bore at the top or head of car engine, and  $4/1000$  inch for truck engines,  $2/1000$  for every inch of bore immediately below the head and  $1/1000$  inch for every inch of bore at the bottom. Very rarely is the piston tapered. The increases of diameter are not necessarily uniform with reference to piston length.

Pistons are of course made to any diameter of cylinder, the stock sizes probably varying somewhat with manufacturing policies, but vary in diameters from  $1\frac{1}{2}$  inches to  $12\frac{1}{2}$  inches and in widths from  $3/16$  to  $3/4$  inches. Standard rings are made to exact cylinder sizes when fully compressed, and are usually made oversize, for rebored cylinders, from  $10$  to  $60/1000$  in  $10/1000$ ths. The rings are fitted to the piston ring grooves by placing the outside of the rings in the grooves and turn the rings and piston completely so that there is knowledge that the rings will seat into the grooves. If the rings are wider than the grooves they are dressed by facing or dressing the edges on a perfectly level surface, preferably a surface plate, with a grinding compound. If the rings cannot be fitted into the cylinder, and the fitting should be so done that the rings will be evenly positioned, precisely as they would be when seated in the grooves, the faces of the split can be dressed with a file. This work should be carefully done so that there will be no more metal taken off than is necessary. The rings are sprung over the top of the piston and with several pieces of thin sheet metal they can be moved across the grooves. While the usual number of rings is three, usually at the top, some pistons will have four and five rings, one of which may be near the bottom. The pistons may be of cast iron, cast semi-steel, various alloys of iron, various alloys of aluminum, or pressed steel. Pistons may be practically the plain cylinder and integral head, which are machined to dimensions, or they may be the hour-glass type or built up. The dimensions and the location of the wristpins, the radiating ribs, the ring grooves and oil grooves are details of design only and these differ with makes.

The wristpins are usually carbon steel, nickel steel or chrome nickel steel, in the form of tube, case hardened and ground to size. The hollow type can have large diameter and be light in weight. The solid pin is seldom used. These are retained by various means, by clamping in the connecting rod or in the piston bosses, dependent upon the connecting rod, oscillating on the pin, or the pin oscillating in bushings in the piston bosses, or the pin may be retained by a snap ring that encircles the piston at the height of the pin, the pin floating in the bosses.

Reboring cylinders is resorted to when the walls are so worn they are not true or when scored by loose wristpins or broken rings. The truth of the cylinder can be tested by a gauge, a number of types being obtainable, the best of which indicate on a dial extending outside of the cylinder. Reboring and reaming tools are both used, the cylinders are finished by lapping. The laps are generally soft metal that can be used with a grinding compound. Emery should not be used for lapping, but pulverized glass or carborundum.

Axles for cars and trucks are usually drop forged from vanadium steel, nickel steel or even chrome nickel steel, and these are heat treated. This applies to front axles. Rear axles for practically all cars are constructed with cast or pressed steel central sections, with steel tubes and cast brake flanges, or they may be entirely of pressed steel. Truck axles may be similarly designed, but heavier construction, for light machines, or they may be with pressed steel or cast steel housings, either sectional or single piece. Or they may be the internal gear type, with the dead axle either round or I section, with the jackshaft in housings of cast or pressed steel and steel tube, assembled by riveting or bolting, or they may be the conventional round or rectangular or I section dead axle used with chain drive.

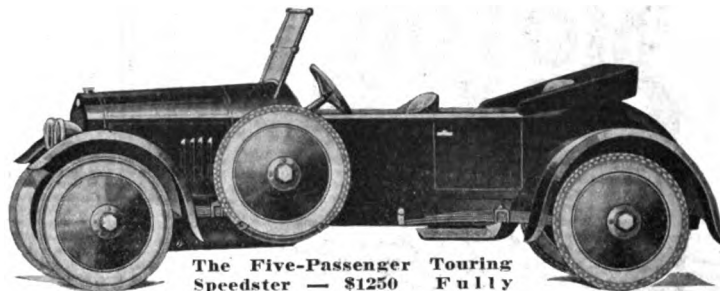
There should be no end or side play in crankshaft bearings. Any play will cause quick destruction of the bearings and will be evidenced by a knock under certain conditions.

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# Announcing the New Victor Pagé Aero-Type Four

*A Product of  
20 Years  
Study*



The Five-Passenger Touring  
Speedster — \$1250 Fully  
Equipped f. o. b. New York.

Economy is the watchword of the new Victor Pagé Aero-Type Four—economy in gas, in oil, in repairs, in tire costs—and in purchase price.

Major Victor W. Pagé, its designer, after 20 years of study, investigation and experiment, has created a light weight, high powered, air-cooled car that puts a stop to the hundred and one needless upkeep expenses that have made good automobiles expensive luxuries. The Victor Pagé Aero-Type Four is unique in a dozen exclusive mechanical perfections—all lending greater economy. It is a triumph of low-cost mileage.

Handsome in contour and finish; smart and modern in design and equipment; sturdy and willing in covering the ground and in obedience to its driver, this new car is of simple operation and ease of adjustment. The vital parts are accessible to quick repair.

Every element of the car works toward avoiding expense. And it has the lines and the "feel" of a high priced car.

Full details and descriptions will be gladly sent upon request. Write today. Exclusive distributing territory for a limited number of established dealers still remains open. Address

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30 miles per gal. of gas—6000  
to 8000 miles per set of tires  
—117-inch wheelbase—Disc  
wheels—30x3½ inch Tires—  
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cooled, overhead Valve Motor  
—Standard Equipment—Con-  
vertible Utility Body.

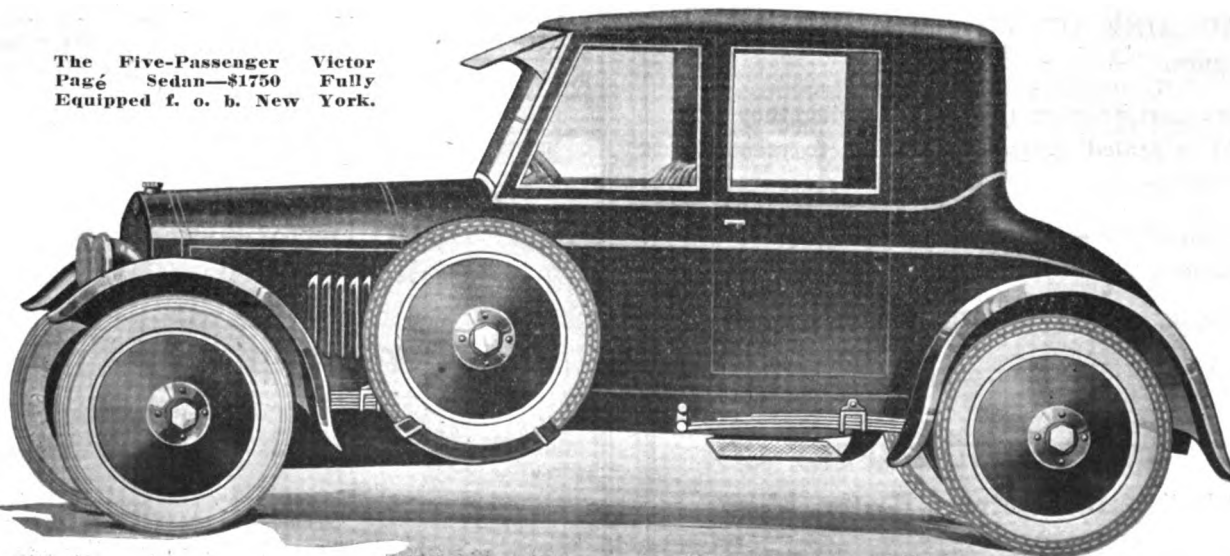
*Sales Manager.*

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The Five-Passenger Victor  
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They cost no more than inferior oils; they are sold in sealed containers in sizes to meet all requirements.

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**AUTOMOBILE  
JOURNAL**  
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# AUTOMOBILE JOURNAL

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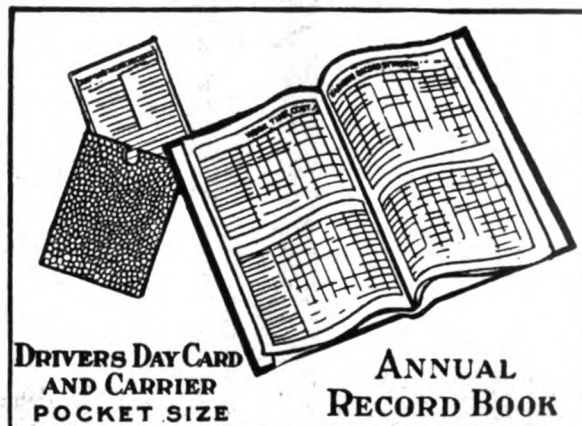
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The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old, or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

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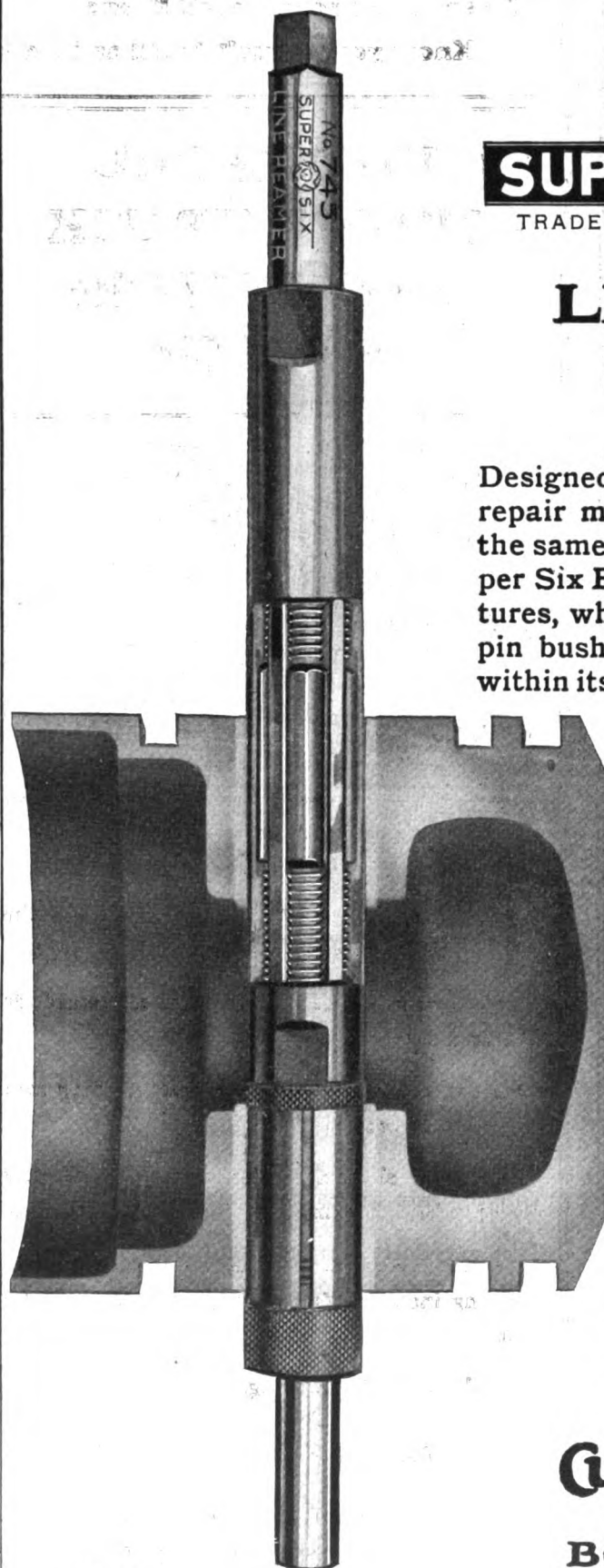
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**LINE REAMER**

PAT. APPLIED FOR

Designed and made for the use of automobile repair men on wrist pin bushings. Embodies the same expansive principles as are in the Super Six Expansion Reamer, but has added features, which adapt it to line reaming of wrist pin bushings and all similarly aligned holes within its scope, and which insure perfect alignment and accurate work.

This size reamer (No. 735) will ream wrist pin bushings for the following cars: Fords and certain models of Buick, Brisco, Cadillac, Elgin Six, Maxwell, Overland, Packard, Paige, Velie Cars and others. Another size now ready for distributors, No. 875 is adapted to use on nearly 80 leading cars and motors.

Other sizes are in process of manufacture and will be announced when ready for distribution. Write for special folder.

Illustration shows reamer in position, having taken the first cut and taking finishing cut of job bushing. It shows the expansive sleeve guiding the leader or pilot of reamer. As the reaming progresses the expansive sleeve is pushed out.

The piston is then inverted and the expansive sleeve inserted in the reamed hole, after which the reaming process is repeated in the same way.

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## PETTINGELL-ANDREWS CO.

*New England Distributor*

100 Brookline Ave., Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

## *An Open Letter To Our Subscribers*

Inasmuch as it is impossible to answer all of the letters from subscribers that have flooded our Mailing Department for the last 10 days with requests for information regarding the delay in issuing our several publications, we take this method of acquainting you with the facts in the case.

About three weeks ago our mechanical departments ceased work because of certain employment ideas that differed somewhat from ours. These differences have now been settled in a way that is satisfactory to all concerned, and from now on you will receive your copies of the magazine on time.

Under the circumstances we know you will overlook the matter of delay this month.

THE PUBLISHER.

# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., MAY, 1921.

NO. 10.

## Rauch & Lang Electric the Epitome of Luxurious Ease

*Car as Built at New Springfield, Massachusetts, Plant Upholds Best Ideals of Rauch & Lang—New Models Radiate High Quality of Former Products*

(By S. G. SWIFT.)

**S**PRINGFIELD, MASS., and its environs, long recognized as one of the leading sections of the world in the manufacture of sterling quality products, is rapidly becoming a manufacturing center for high grade automobiles. This condition no doubt is brought about in part by the many available expert mechanics who make their homes there and because it is

near the source of high grade materials, all of which should be a matter of pride to those who have the best interests of industrial New England at heart.

Most of these efficient workers have been trained in the different gun shops of the city and their superior ability is

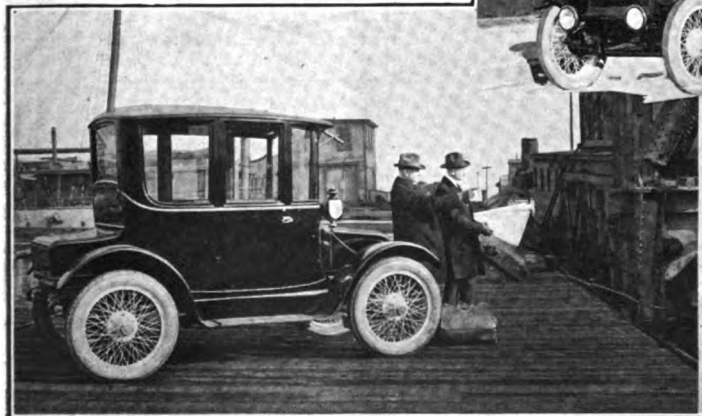


President Paul A. Frank at Desk in Private Office.

known throughout the country. As a class they are probably the best all-round mechanics in the United States.

The builders of the Rauch & Lang Electric automobile were for many years located in the middle west. The executives of the country had long realized the superiority of the New England workman, and when actual machinists capable of doing quality

work became hard to secure, seriously considered transferring the manufacture of Rauch & Lang Electrics to New England. There was also another reason which influenced them to take this step, and that was the trouble experienced in obtaining parts.



The Rauch & Lang Electric Is Truly a Car for All Occasions. It Can Be Driven by Any Member of the Family and Is as Well Adapted for Business as for Pleasure.



A Corner of One of the General Business Offices.

This company always placed quality above quantity production and demanded thoroughness and accuracy above all things. This of course meant limited production which, with its consequent of small quantity orders did not interest certain western makers of parts sufficiently to secure prompt delivery and a reasonable price.

Inasmuch as many of the parts bought outside the factory were made in New England anyway, the company concluded that substantial gains could be made both in the workmanship and quality of the car by coming east and locating their plant in the Springfield, Mass., district.

As a result of this decision the contemplated change was made about a year ago, and the first unit of the new plant is now fully completed and in production, thereby adding a new product of international reputation to the list of those made in or near Springfield that have taken a leading place in American industries. The factory is situated in Chicopee Falls, and at the present time there are 300 men working. Much overtime is necessary to speed up the production on the orders to be delivered, and to supply dealers with cars for demonstration and display purposes. The present force is producing at the rate of eight cars in the working week, and it is understood that it will be augmented by 200 more mechanics in the near future.

The company intends to build and market about 400 cars during the remainder of the year and about twice that number in 1922. With the addition of another unit the plant will have capacity to turn out 1800 to 2000 cars a

year, and will employ about 800 men.

The car is still being built according to former design and construction, the same careful attention being given to every detail and the same high quality of workmanship and materials being employed throughout. The company engineers feel that the present product is in reality a better one than the old, due to more modern production facilities, a better lighted and equipped factory and a higher grade of skilled mechanics.

The present plant was erected at an approximate cost of \$350,000. It is of modern one-story, brick, sawtooth construction, 300 by 320 feet and provides nearly 100,000 square feet of floor space. It is well lighted, the ventilation system is ideal, and there are broad unobstructed working areas. It is operated throughout by electric power. The entire building was designed and laid out to meet the particular requirements of that business, and to manufacture as efficiently and economically as possible. Every time and labor saving device that could be employed without in any way jeopardizing the fine quality of work, was made use of and the plant is a model one in every detail.

#### General Features of the Rauch & Lang.

The Rauch & Lang electric automobile is noiseless, free from vibration, has a world of power, of simple, sturdy construction with few moving parts to get out of order or require attention. Friction has been reduced to a minimum. The car is easily operated, flexible, of rapid acceleration, is quickly stopped and is free from mechanical complications.

It is roomy, and comfortable. The appearance of the car is all that the most critical could wish, the body work especially being the finest possible example of the coach builders' art.

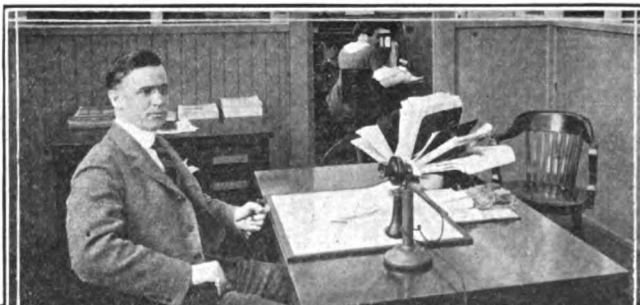
#### Steady Flow of Silent Economical Power.

There are no lapses of power in the Rauch & Lang Electric. This means that there are no noises and most important, no vibrations. Instead, there is a steady flow of silent economical power that is available at all times. The smoothness of operation means greater power as it is constant even pulling power that counts. Power of this kind takes one up hill without jerk or jar, and without fear of stalling the engine.

It performs as consistently on muddy roads or through drifted snow. The Rauch & Lang chassis is of clean cut efficient design. Great strength without cumbersome weight is a feature, and one realizes instinctively that the machine has been built for service.

All parts are carefully machined and the entire chassis is bushed wherever a bushing can be used to advantage. This means that the repairman should see but little of the car, and also insures it against undue wear. Less parts also mean less wear, tear and breakage, and rattles are reduced to a minimum.

The power principle is simplicity itself. Battery and motor furnish this, and the controller regulates the speed. This simplicity of design and principle has much to do with the dependable power of the machine, which is ideal for many other reasons. Because of its design it has an exceptionally short turning radius, thereby insuring ease of handling in narrow streets and congested traffic, while its special construction gives wonderful service without appreciable wear. All parts are accessible, assuring greater service convenience, as well as economy of upkeep. The chassis is sufficiently long to accommodate the luxurious coach body. It is so flexible that prac-



Center—H. H. Doering, Vice President and General Sales Manager. Left—E. I. Rusk, Chief Engineer; E. O'Donnell, Plant Engineer. Right—R. W. Stanley, General Manager; N. Platt, Vice President and Export Manager.



tically all road shocks are absorbed before they reach the body of the car. There is none of the pitching or side sway motion to annoy one, the machine gliding along swiftly and smoothly. Regardless of whether the going is city streets, macadam road or bumpy pavements, the passengers have the sensation of gliding rather than riding.

**Rauch & Lang Electric is Ideal Car for All Occasions.**

The Rauch & Lang automobile is a car for all occasions. It can be used for at least 95 per cent of all trips, long or short. Being easily driven it can be operated by any one in the family rather than by one experienced operator, and one frequently sees the aged grandparent driving along with as much nonchal-

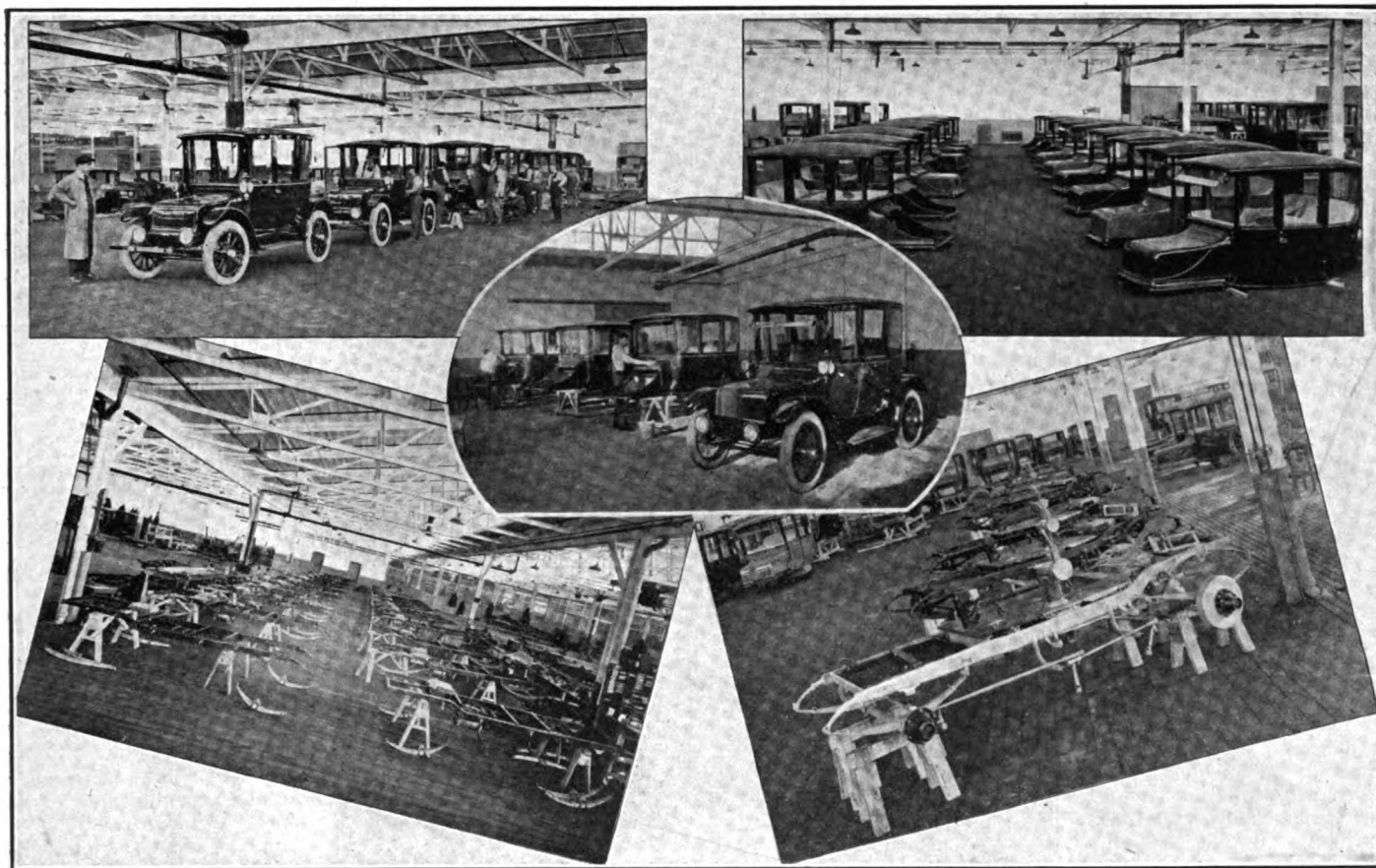
with the knowledge that the machine will be there when he returns and the parcels or wraps left inside will not have been disturbed. More than 175,000 automobiles were stolen in the United States last year but there were no Rauch and Lang Electrics among this lot, which speaks volumes for the protection offered by the door and power locking devices.

On days when the man of the family does not require the electric, he is taken to the suburban train or to his office after which any member of the family may use the machine. Mother drives or any one of the children who have licenses to do so, and the car is used for shopping, marketing or for any other similar errand. Sometimes the family takes a trip into the country—away from the

One arrives at his destination unruffled and leaves at his pleasure.

**Economical in Upkeep and Operation.**

One good feature of the many which are distinctly Rauch and Lang, is the fact that the machine has marked economy of upkeep. It almost never has to be taken to a repair shop, and tires give the fullest mileage. In fact the tires usually deteriorate from age, and it is seldom that one ever blows out in service. Thus depreciation is reduced to the minimum and repair and replacement costs are negligible. The average bill for electric current is less than \$6 a month. Lubricating cost is very slight, and due to the safety features of the machine, fire and theft insurance rates are usually low.



Upper Left—Final Assembly. Upper Right—Body Department. Lower Left—Chassis Assembly. Lower Right—Chassis Painting. Center—Finishing Department. There Are No Partitions in This Modern Plant Excepting Those of Different Stock Rooms.

ance as is displayed by the lad of fifteen. Where a man's business necessitates his going on short trips around town the machine is ideal.

Its wonderful flexibility enables him to wend his way quickly and safely through traffic without effort or strain. He experiences the utmost confidence because of the rapid acceleration and dependable brakes. He knows that one charge of the battery will take him much further than he requires to go in any one day at least, and he can get as much speed as the ordinary person cares for.

Regardless of the weather he arrives at his destination as immaculate as when he started and on time to keep his engagement. When he leaves the car on the street he locks the controller, turns the key in the Yale door lock and leaves

stuffy odors of the city into the great out doors. It gives them a change of scene and adds to the delights of motoring, an exhilarating touch. It is in every sense a family car.

For social calls, the matinee, the reception, the opera—in all sorts of weather—all seasons—night or day—three hundred and sixty five days in the year, the Rauch & Lang Electric is the ever ready, safe, clean, comfortable and dependable conveyance.

It is so cozy and snug that chilling winter rains or winds have no terrors for the owner. Neither does the hot summer sun cause any discomfort, as the easily raised or lowered windows allow one to transform the car from a closed to an open top. There are no chauffeurs to contend with, no delays or annoyances.

**Rauch & Lang Electrics Reflect Individuality and Distinction.**

Those who are accustomed to and can afford the best demand motor cars of distinction and individuality. They want the best examples of the coach builders art. Such persons insist on simple, graceful, sturdy lines, coupled with distinction, harmony and good taste.

For nearly three quarters of a century Rauch & Lang closed coach work has especially appealed to people of refinement and discriminating judgment. It is only natural that with the inception of the automobile many who were users of Rauch & Lang carriages turned to the luxurious electric made by the firm, and it was from trade of this class that the original market was formed.

Naturally the Rauch & Lang Electric

costs more money than many others. The fine things are expensive, and one realizes that he gets what he pays for as a rule regardless of what he may be purchasing. This is the law of compensation, which, founded on the rudimentary principle of averages, works out in all lines of legitimate business. The Rauch & Lang automobile has never been a compromise product. Built in limited quantities of the finest materials, by skilled artisans, regardless of cost, it has always typified the epitome of mechanical art. In the latest product, according to the trained judgment of the writer, will be found the same loyal adherence to the high standards for which the product has been justly famed for many years. The splendid coach-work is not only unusually beautiful and distinctive, but it embodies the ideas of those who are interested in fine motor car development. In design, material and workmanship—in every detail of construction the Rauch & Lang Electric carries out the best traditions of custom coach work and mechanical excellence.

#### Mechanical Characteristics of the Rauch & Lang Electric.

Rauch & Lang Electric cars are built in two standard types on 102-inch wheelbase. Both are five-passenger cars and are the same in quality, principle of design and construction. Practically the only difference in the two types is in the drive, the front seating arrangement, the driving position and in the number of cells in the battery.

The brougham has a body of the same length and width as the coach. It seats three persons snugly but comfortably on the rear seat. Instead of two chairs in front, as in the coach, it has one revolving Pullman type chair in the right front corner and a deeply upholstered box seat and package compartment in the left front corner.

There is an abundance of leg room. The drive is from the left rear seat by means of a lever. Both the steering and control handles are in very natural and restful positions. This model has 42 cells of battery—the same as the coach.

The coach is regularly equipped with the Rauch & Lang double control, which

permits operation of the car from either the front or rear seat. It is simple and reliable. There are no complicated levers or pedals to operate, no sticking of disappearing brakes, no confusing details to remember. By merely turning the left front chair, the drive may be changed from front to rear or rear to front as occasion demands. It is never necessary to have any one sit in front of the driver, and the view, therefore, is unobstructed. There are a number of excellent safety features. For example, when driving from the front seat, it is impossible for the passengers in the rear to operate the break or controller. They are automatically locked when the chair is turned into driving position. Moreover, the driver's chair will turn either to the right or left thereby permitting entrance or exit from either door. This is particularly desirable when the chauffeur is driving, as he can leave the car without disturbing the other passengers. The Rauch & Lang steering bar is raised to vertical position when not in use or when changing drives. It is not necessary for the occupants to get out or change their positions. This model is very roomy and comfortable. It is the acme of elegance in closed cars. It is equipped with 42 cells of battery.

#### Brief Specifications.

Wheelbase—102 inches in both coach and brougham.

Wheels—artillery type, wooden. Wire wheels at extra cost.

Tires—33" x 4½" Goodrich or Goodyear Cord—ribbed or safety tread.

Axles—both axles are of own design and construction.

Springs—front, semi-elliptic. Rear, seven-eighths elliptic. Design eliminates objectionable side-swaying motion. The

drive is through the forward lower half of rear springs as in finest gas cars.

Frame—rigid channel section of pressed alloy steel with strong supporting cross-members.

Motor—the Rauch & Lang Hertner type—designed and built in own factory—compound winding, light in weight, highly efficient, large overload capacity.

Drive—the drive is direct from motor to propeller shaft—thence through top mounted straight type worm gear to rear axle. There are two universal and one sliding joints in the propeller shaft, thereby insuring great flexibility and unsurpassed riding action.

A vanadium steel torque rod, running from motor to worm gear housing—with universal action and ball and socket support—takes driving strain. The shock of starting and stopping is completely absorbed. The worm gear drive is silent, requires no adjustment, increases in efficiency with use and has practically no wear out to it. This method of transmission is in accordance with the best engineering practise throughout the world.

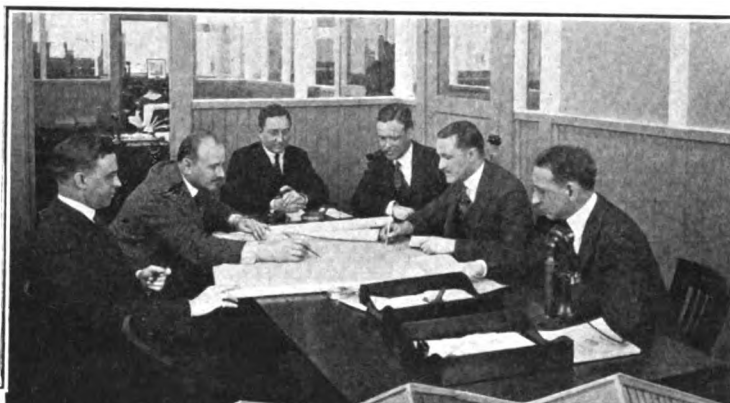
Controller—own design, no arc, flat type, operating on principle of rheostat. Very few moving parts. Operated by simple natural forward motion of side lever. Six speeds forward—four in reverse. By pulling back of neutral, the electric and mechanical brakes are operated on the transmission.

Battery—42 cells in both models, with provision for additional cells. Best standard makes of lead battery.

Brakes—Two sets—one on rear wheels, the other on the motor. Rear hub brakes are very large and strong—have special features for adjustment and relining. Operated by foot brake. The other combines both a mechanical and electric brake operated on the motor by gently pulling backward on the control handle.

Equipment—Includes two head lamps with special approved lenses, two side lamps, with "no glare," frosted bulbs and tail lamp, interior dome lamp operated by opening and closing door; also two rear quarter lamps operated from same switch as outside lamps. Meter lamp operated by floor push.

Adjustable "seeback" mir-



Above—A Conference of the Executive Committee. Center—First Unit of Modern Manufacturing Building Which Houses Present Organization of Rauch & Lang, Inc. Lower Left—Type of Luxurious Electric Vehicle Manufactured.

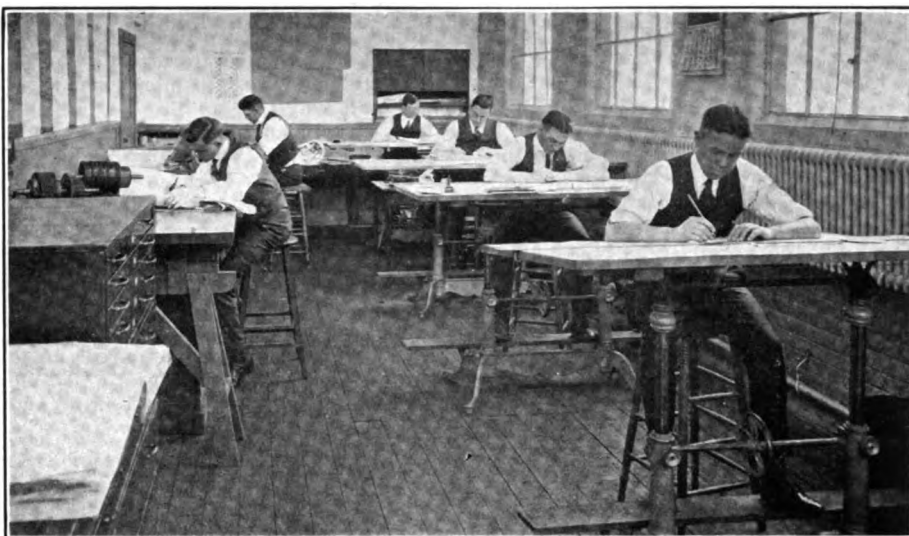
ror running full width of car, quick-acting mechanical window lift, frameless plate glass windows, rain vision shield, combination instrument panel, including ampere hour meter, volt meter, ampere meter, Warner Autometer with mileage speed and trip dials, illuminated so that it can be easily read at night as well as day. Waltham eight-day timepiece, separate case containing mirror and memorandum book, Klaxon Horn, kit of tools.

**Officials of the Company Long Connected With Automotive Industry.**

Modern equipment alone will not turn out quality production. There must be ability and experience back of it. In this respect Rauch & Lang is especially fortunate. Its organization is composed of men of wide experience in the automotive field—men who have been through the school of "hard knocks" and have a wealth of knowledge of this particular product and are capable of handling any situation that may arise in the conduct of the business.

This company is now headed by Paul A. Frank, who was successively with the C. P. Kimball company, the Woods Motor Vehicle Company of Chicago and the Anderson Electric Car Company of Detroit, Michigan. During the last four years he has been at the head of the Magnetic Motors Corp., distributor in the Chicago district for the Rauch & Lang Electric.

R. W. Stanley, the First Vice President

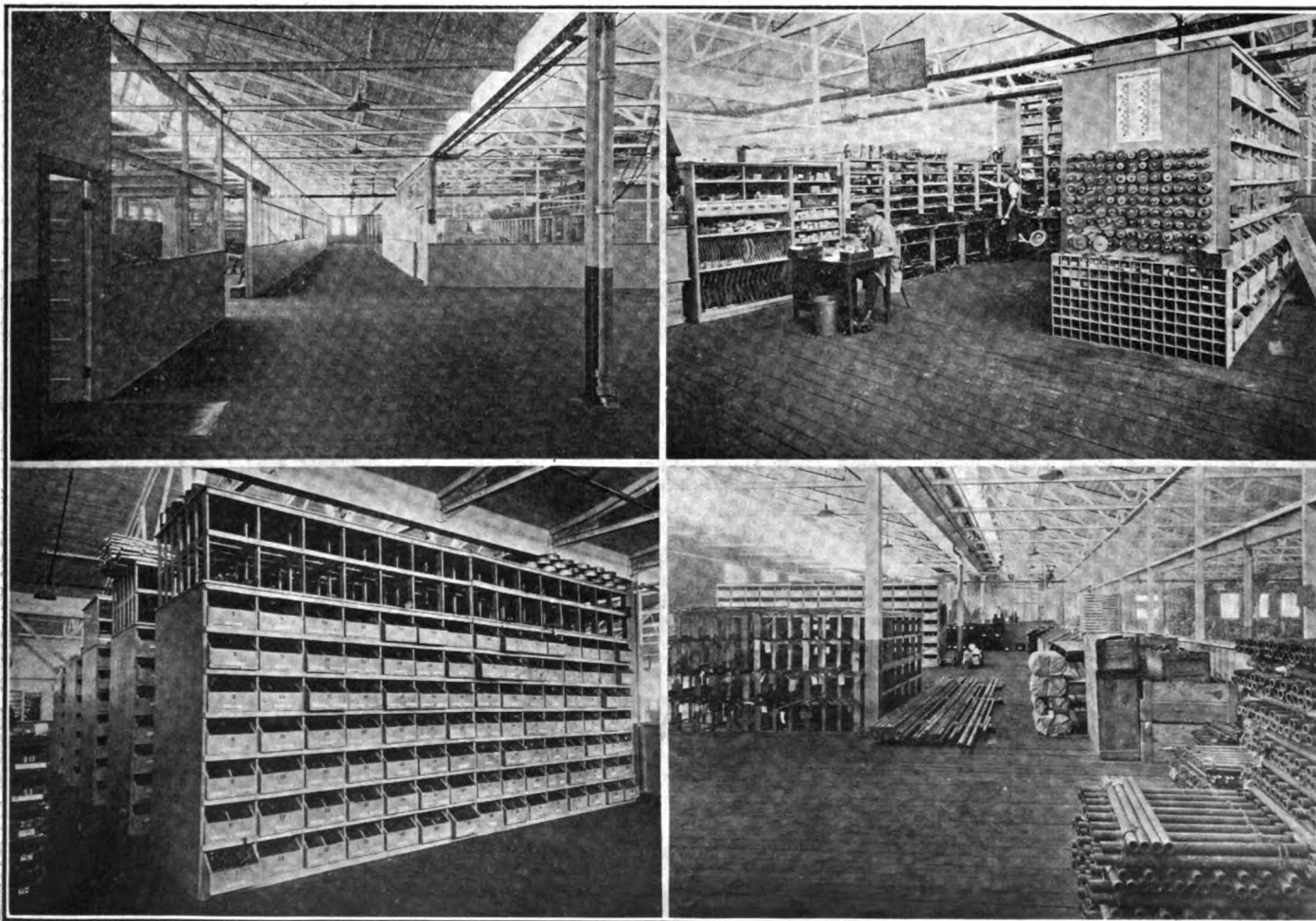


**Well Appointed Drafting Room Indicates General Excellence of Factory Equipment.**

and general manager is a graduate engineer of broad training along automotive lines. He has served in various executive capacities with the General Electric Company and the Owen Magnetic car. As chief engineer in charge of production with the latter concern he developed the Entz transmission and made it commercially practical. He also served as consulting engineer for the Biddle Motor Car Company and the International Fabricating Company.

Harry H. Doering, 2d Vice President

is in charge of sales and advertising and Nathaniel Platt, 3d Vice President is in charge of export and manager of the New York branch. Both are men of long experience in the electric automobile business. Mr. Doering has been general sales manager for Rauch & Lang for the last four years having previously been manager of the Philadelphia branch for several years. Prior to this he acted as general sales and advertising manager for the Ohio Electric Car Company, and the Gramm Motor Truck Company.



**Upper Left—General View of the Stock and Tool Rooms. Upper Right—A Corner of One of the Tool Cribs. Lower Left—Section of Production Stock Room. Lower Right—Rough Stock Room.**



Mr. Platt has continuously been in charge of the domestic and foreign sales of electric cars in New York during the past fifteen years having first handled the Baker electric and later the Rauch & Lang.

Chief Engineer E. I. Rusk came to the company from the Biddle Motor Car Company. He formerly served in an engineering capacity with the Flat Motor Car Company, the American Locomotive Company, the Entz Motor Patents Corporation, and the Owen Magnetic Motor Car Company. He was also employed at one time by the General Electric Company on special work.

All purchases are directed by P. D. LeVeness, who also has charge of the service department, having served in a similar capacity with the Locomobile Company of America, later entering the sales department. Prior to this he was a member of the sales organization of the Pierce Arrow Company.

#### Interesting Development of the Rauch & Lang.

The history of Rauch & Lang dates back nearly three quarters of a century when Jacob Rauch started in the carriage business out in Cleveland. His skill and artistry combined with his painstaking care were lavished on phaetons, high two-wheeled traps, broughams and

urious. They were anything but comfortable, and the new concern seized on this phase of the matter as one which they could improve in a marked manner. The result was the building of what is said to have been the first enclosed body on an automobile. This body exemplified the fine coach work of those days, and is reflected in the modern Rauch & Lang electric.

Mounted on the electric car chassis, it did much to enhance the early popularity of the electric. Its quiet easy operation, coupled with its enclosed car comfort and the niceties of its appointments made it truly a luxury, and it naturally became the choice of people of refinement and taste for exclusive social usage as well as for year round driving.

The developments of succeeding years were rapid and the factory had to be en-

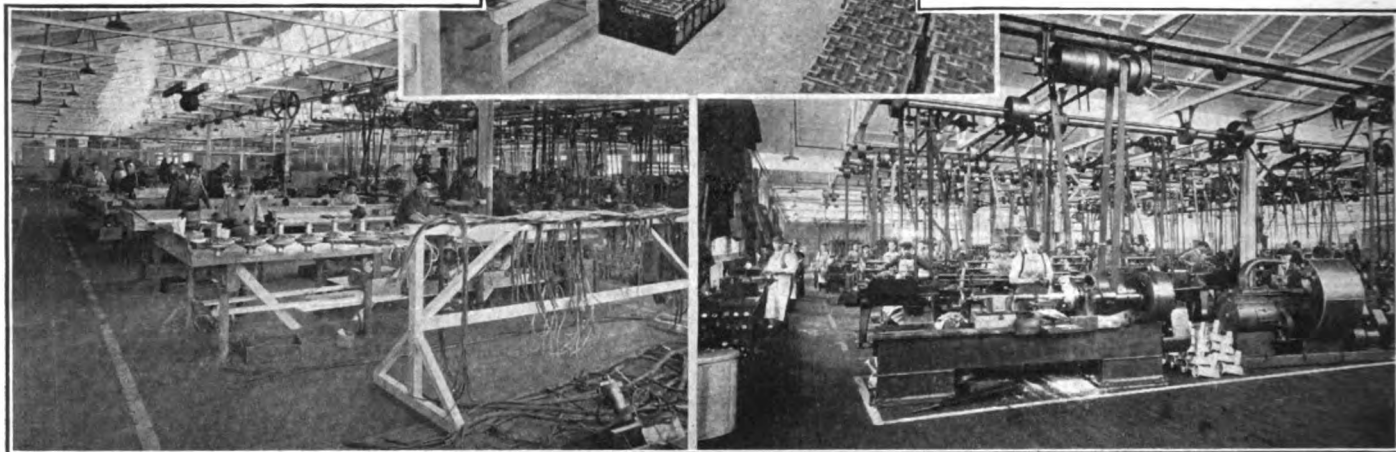
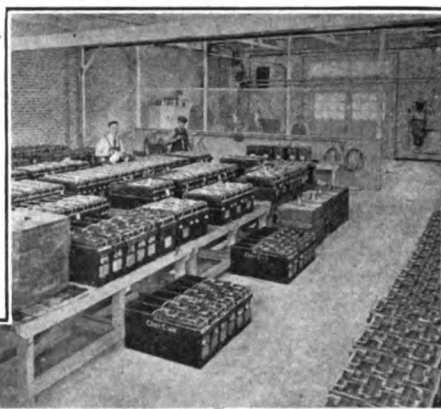
O'Donnell and Contractor P. J. Kennedy, was completed and production was started in record breaking time.

The new Rauch & Lang electric automobile is continuing to live up to its reputation as one of the truly fine cars of America. This reputation is the natural result of a combination of quality manufacture and solid, substantial, fair business dealing that is as apparent today as it was at the inception of the business. Rauch & Lang, Inc., continues to keep faith with the best traditions of its three-quarters of a century of sterling performance.

#### CARE ADDS TO LIFE OF TIRES AND CAR.

After driving a new car approximately 1000 miles the wise motorist will drain all of the oil out of the engine, give it a thorough cleaning and refill with fresh oil. This operation should be repeated every 1000 to 1500 miles service to clean out any particles of metal, grit and sediment that may have accumulated.

Tires also need care in order that they may give maximum mileage. At the end of every 2500 miles a tire should be deflated, dismounted, the soapstone and grit removed and the inside of the cas-



Center—The Battery Department. Left—The Unit Assembly Department. Right—The Machine Department. Every Inch of This Finely Appointed Factory Is Assured of Ample Light by Reason of the Sawtooth Roof Construction.

coaches, and his carriages were masterpieces of coach building. For half a century he plied his trade being joined in the venture by Mr. Lang, and the business prospered as the Rauch & Lang Company.

With the advent of the horseless carriage more than 20 years ago, these far-sighted business men, seeing "the handwriting on the wall, decided to enter the motor carriage business, not an easy decision to arrive at in those days. The carriage business was flourishing, whereas the automobile was an unknown quantity that made the step somewhat of a venture. It was a case of pioneering. The electric vehicle appealed to these men as the one best suited to their endeavors, and they started the manufacture of what is today the Rauch & Lang Electric Automobile.

The motor cars of those days were truly a luxury, so far as money spent was concerned, but they were far from lux-

larged several times to meet the growing demand. In 1915 the company consolidated with the Baker Motor Vehicle Company under the name of the Baker R. & L. Company, which broadened the scope of operations and gave added capital to the company. Shortly after this the Baker Electric was discontinued and the combined energies of the two companies were placed behind the Rauch & Lang product.

In January 1920, when it was decided to move the business to an eastern location, a new company was incorporated under the name of Rauch & Lang, Inc. This company had an authorized capital of \$5,000,000 and on Feb. 1 the Baker R. & L. Co. transferred its assets to the new organization. Temporary arrangements were made to remove to the old Stevens-Duryea plant at Chicopee Falls and manufacturing was started at that place. Some time ago the new factory under the direction of Plant Engineer E.

ing washed with gasoline. After drying the inside should be dusted with talc, the tire mounted and the tube inflated with fresh air. A close inspection of the tread should also be made for cuts and fragments of glass. The rims should be cleaned of rust and painted.

#### TO SELL A USED CAR.

The man who is trying to sell a used car should always remember that the purchaser is more interested in the general appearance of the car than he is in the mechanical units. A coat of paint or a little touching up and varnishing will do more to sell a used car than all of the talk that the seller can think up. Instances have been known where \$50 or \$100 more was obtained for a car that had been painted and some small equipment added than was expected in the first place.



# NOTES OF INDUSTRY AND TRADE

## *Cadillac Co. Removes Offices to New Detroit Plant*

The general offices of the Cadillac Motor Car Co. have been moved into the new plant, 2860 Clark avenue, Detroit, an illustration of which is given herewith.

The offices which are transferred from the old location at 6231 Cass avenue, include that of the president, the purchasing, accounting, manufacturing, sales and advertising departments, and include all the administrative departments of the company.

The new Cadillac plant on Clark avenue is south of Michigan avenue, the approximate distance of two blocks, just within the three-mile circle from the City hall, and about a mile from the Michigan Central railroad station. The land occupied is the triangle formed by Clark avenue and the junction of the Michigan Central and Lake Shore railroads. Buildings stand on both sides of Clark avenue.

end under their own power.

Conveniently near the manufacturing building is the heat treatment building, 500 feet by 80 feet, where the metal is treated to assure its strength for the part it will be called upon to play in Cadillac dependability.

The assembly building is the second largest of the group, being 800 by 360 feet, with a floor space of 620,000 feet. After leaving the manufacturing building a chassis will be given a road test and then taken to the assembly building, where it will be given further tests and will then be fitted with the body and the many accessories which are a regular part of Cadillac equipment.

The storage building, which adjoins the assembly building, has space for 1000 cars. It is 480 feet long by 140 feet wide. The factory service department will also be housed in this building.

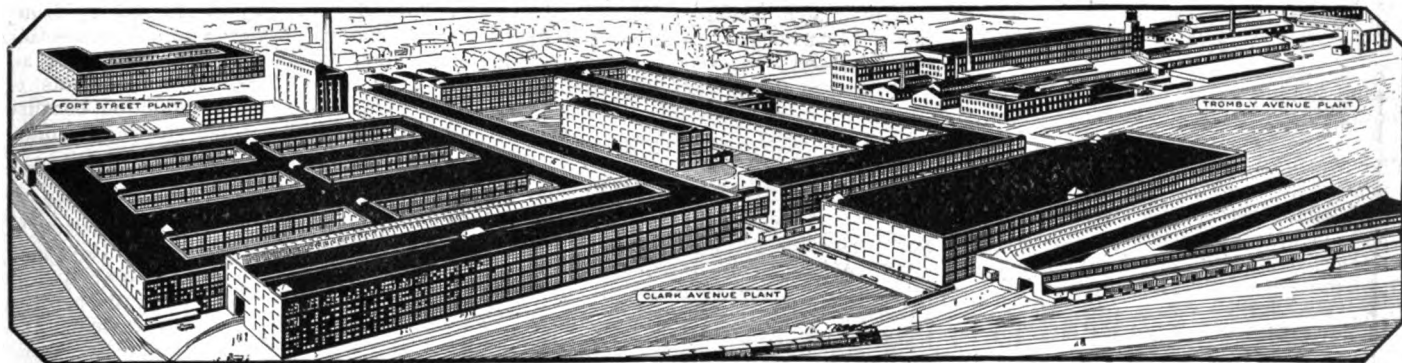
would aid in improving the dependability of the always dependable Cadillac.

### RESTORATION OF WORLD'S COMMERCE.

"The Restoration of the World's Commerce" will be the general subject taken up at the first annual meeting of the International Chamber of Commerce in London during the week beginning June 27.

Arrangements are being made for a programme of general sessions and group meetings to discuss international economic problems in the fields of finance, ocean and land transportation, communication, production and distribution, and restoration of the devastated areas. All of these topics will be approached with a view to relating them to the central theme.

The International Chamber was organized at Paris last year by representatives from Belgium, France, Great Britain, Italy and the United States. Preparation is now well advanced for participa-



View of Mammoth Plant of Cadillac Motor Car Co. in Detroit, Mich., Showing New Clark Avenue Unit in Foreground.

Engineers and others who have inspected this great plant which has been erected under the direction of R. H. Collins, president and general manager of the Cadillac company, have characterized it as one of the most modern automobile factories in the world. The buildings contain 48 acres of floor space.

The new plant stands as a monument to Cadillac growth. The buildings are of the most modern construction of steel, concrete and brick, with immense window expanse to assure ample light for the workers who make the Cadillac. They are four stories high, built to carry two additional stories.

Some idea of the vastness of the new plant may be gained from the fact that the manufacture of the Cadillac has in the past been carried on in 77 different buildings in Detroit. In the future all the operations will be confined to the new plant, which consists of eight great buildings.

Of these the greatest is the manufacturing building, which is 800 feet long by 600 feet wide, with a total floor space of 970,000 feet. Under the manufacturing plan raw materials will be received at one end of this mammoth building and Cadillac chassis will leave the opposite

The executive offices are housed in a handsome administration building, 225 feet long and 50 feet wide. This building is to be in thorough keeping with Cadillac history and Cadillac prestige. The exterior is of Bedford limestone and the interior is arranged to afford maximum convenience to the executives who will be housed there. The fittings are rich but in quiet taste.

The power plant is one of the most modern in the country, as are the supplementary buildings which complete this unit.

Particular thought has been given to the comfort and surroundings of the 6000 employees who will work in this great plant. There are locker rooms sufficient to give each worker a steel locker individually, and special bridges, walks, etc., have been provided so that men may enter the plant and leave in the shortest time with the least confusion.

The welfare department and first aid hospital, in charge of a physician and nurse, is so located that it can be reached from any part of the plant in a few minutes.

In fact, every resource which great capital and engineering skill could give has been concentrated to build a plant which

tion of a number of other countries in the organization. The American section has been organized for some time with offices at the headquarters of the Chamber of Commerce of the United States in Washington.

### BEARINGS CO. APPOINTS MANAGERS.

The Bearings Service Co., Detroit, Mich., announces the following recent managerial appointments:

H. N. Brandon to become manager of the St. Louis branch, with headquarters at 3300 Locust street. Mr. Brandon has been with the Bearings Co. since February, 1919, at first at the Atlanta, Ga., branch as travelling representative and later in the same capacity at Omaha, Neb., and Milwaukee, Wis.

E. L. Farnsworth takes over the supervision of the Milwaukee branch, 145 Onelda street, succeeding Mr. Brandon. He has been with this branch as travelling representative since 1920.

M. D. Wallace, who has been associated with the Bearings Service Co., first as salesman and later as assistant manager of the New York City branch, has become manager of the Baltimore branch, 1041 Cathedral street.

# HUMOROUS SIDE OF MOTORING

## RHYMED ADVERTISEMENTS.

Climb that hill? Of course I'll make  
her,  
Because my car's a ———

The road is bad and full of ruts  
But it doesn't bother my sturdy ———

He cried aloud: "All get aboard  
And we'll take a ride in the trusty  
———."

What though the day be cold and cheer-  
less,  
We'll spin along in the old ———

Air soft, sun warm and the track hard,  
Clear the way for the speedy ———

What cleaves the air like an arrow  
fierce?  
Of course, that one must be a ———

Will said 'e—and Will is right  
No sleeveless engine is the ———

Engine boiling, your bosom ranklin',  
Couldn't be if 'twas a ———

Who wrote "The Autocrat" and many  
pomes?  
New England gent by the name of ———

P. Henry said with fullest breath,  
"Give me ——— or give me death."

Said he: "Not one thing I'll lack  
When they deliver my ———."

The speedometer reading goes up and  
up.  
The engine purrs, the car's a ———

Journey ended, sooner than soon,  
When you travel in the ———

Regardless of roads the car it tracks  
well.  
What car do I mean? Of course, the  
———

Washington, Lincoln, Roosevelt, Lodge,  
Add Hall of Fame: The Brothers ———

Count your pelf. If you can afford an  
Automobile, why not buy a ———?

Another breakdown? 'Tis too much,  
really.  
Next car I get will be a ———.

To prove the rule, here's a perfect ex-  
emplar—  
You needn't be Knight, though you be  
a ———

## BUT THINK OF THE PRICE OF SHOES!

One of the best ways to bring back  
gasoline to 20 cents is to use a 1920  
model walking stick.

## AN INNOVATION IN WRENCHES.

An automobilist dropped into a hard-  
ware store to purchase a wrench. "Want  
a good sized one," he said. The dealer,  
after glancing at his heavy face and mot-  
tled nose disappeared down the cellar  
stairs, returning in a moment with a  
large, clumsy looking tool, which he of-  
fered to the car owner.

"Sort of out of balance," objected the  
customer, handing the wrench back after  
a perfunctory glance. "Handle's too  
heavy." "Sure," answered the dealer.  
"Just what you want."

"What d'you mean—just what I want?"  
the customer asked. The dealer was  
busily unscrewing the nut at the end of  
the handle.

"See!" he said, again offering the  
wrench to the customer. "Got a hollow  
handle that holds three drinks of liquor,  
and—"

"Give me a dozen of them," said the  
motorist hurriedly. And as the dealer  
hastened away to execute the order, "Be  
sure they're filled, too," he called.

## HIS ATTITUDE.

"Does you still refuse, sah, to loan me  
back them two dolluhs I loaned you las'  
year when you wanted to buy that  
secon-han' tire your youah flivvuh?"

"Nossuh, I don't refuse at all suh," an-  
swered Brother Bunc. "I jest simply re-  
frains."

## A MORE DIGNIFIED NAME.

"So you're a moonshiner," said the  
touring automobilist. The tall moun-  
taineer frowned. "Since pro'tion we call  
ourselves irrigation engineers," he an-  
nounced in dignified accents.

## O, TRUCKMAN, ETC.

Wellesley's giant elm on Maugus ave-  
nue was recently run into and injured by  
a wild truck. Fearing that the old land-  
mark which has so long withstood the  
ravages of time and elements may now  
fall beneath the assault of some careless  
truckman, the town's laureate has com-  
posed the following and posted it on the  
trunk:

O, truckman,  
Spare this tree;  
Have a heart  
And don't butt me.  
The street is narrow,  
But the world is wide;  
Try to back  
On the other side.

## IT CONNECTS.

Teacher—What is a conjunction?  
Johnnie—(After reflecting a moment)  
—"A conjunction is a word connecting  
anything, such as, "The wheel is at-  
tached to the automobile by means of  
the axle. Axle is a conjunction because  
it connects the wheel to the automo-  
bile."

## TOUGH.

"Remember, it rains on the just and  
the unjust alike."

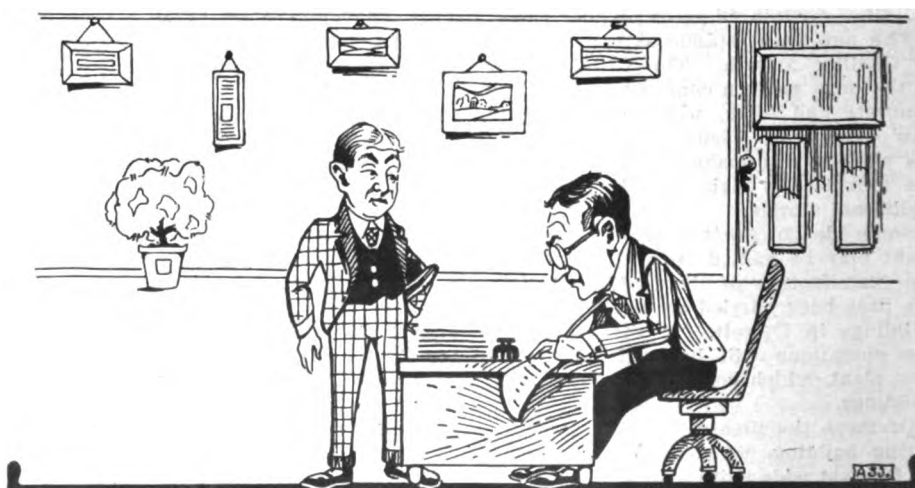
"Yes; but the unjust generally are the  
ones who can afford to hire taxicabs and  
not get wet."—Judge.

## ONE WAY.

Redd: "The doctor said he'd have me  
out on my feet in a fortnight."

Greene: "And did he?"

"Sure. I've had to sell my automo-  
bile."



Uncle John—So you're going into the automobile business for yourself. How  
are you going to get financial backing?

Nephew—Well, blood's thicker than water, Uncle, so I've decided to give  
you first chance at the investment.

# Personal News of Industry and Trade

## Ansted on the Automotive Outlook

Frank B. Ansted, president of the United States Automotive Corporation, the chief subsidiary of which is the Lex-



Frank B. Ansted, President of the United States Automotive Corporation, Connersville, Ind.—Photo from Portrait Painted by Well Known Artist.

ington Motor Co., has returned to his home in Connersville, Ind., after a three months' tour among Lexington dealers and distributors on the Pacific coast and the West from Canada to Mexico. During this period he worked with some 200 distributors, dealers and salesmen, conferred with 89 bankers, discussed conditions, local and national, with 250 farmers and other producers, addressed 26 commercial organizations and talked with individuals innumerable. In a recent interview Mr. Ansted stated that he found, on the whole, business on high ground. The automotive industry is on its feet and sales, especially on the Pacific coast, are exceptionally encouraging and he feels very optimistic over the future of the industry.

R. C. Rawley has rejoined the sales staff of the Remy Electric Co., Anderson, Ind., and will work under the supervision of G. B. Stone, general sales manager. About a year ago Mr. Rawley resigned from the Remy sales department to engage in engineering sales work on his own account. Prior to that he had been a member of the Remy organization since 1918, going to that concern from the Mitchell Motor Car Co., where he was engineer in charge of electrical installation.

J. D. Thompson has sold his interest in the Buick automobile agency at Cedar Falls, Ia., and has taken charge of the agency for the Equitable Life Insurance Co. in northeastern Iowa.

E. P. Grismer is in charge of the Cleveland sales office of the Stewart Manufacturing Corporation, 942 Prospect avenue.

E. Hunn, Jr., was recently made general manager of the Enterprise Motor Corporation, New York city, which handles the Kelley-Springfield truck, one of the products of Hare's Motors. Mr. Hunn has been assistant to Emlen H. Hare, president of Hare's Motors. George H. Hauck is general sales manager of the Enterprise Co. and E. H. Dorman retains his position as service manager.

Frederic N. Dodge, who was recently appointed sales manager of the Cleveland branch of the Baker-Fisk-Hugill Co., Dort distributor in Detroit, was formerly assistant advertising manager of the Dort Motor Car Co. of Flint, Mich. He also previously held the position of sales promotion manager of the automobile and service station equipment division of the Fairbanks Co. of New York.

Charles O'Harrow, who has been connected with the automotive industry in Waterloo, Ia., for a number of years, has become associated with the A. L. Alexander Co. as director of sales. The Alexander Co. distributes Liberty and Chevrolet cars.



Stephen E. Howell, Recently Promoted to Be Manager of Toronto, Can., Branch of A. Schrader's Son, Inc., Brooklyn, N. Y.

Karl W. Volk of Cleveland, O., has been made manager of the service station at Toledo, O., of the Stewart Products Corporation. He was formerly at the Peerless car factory for seven years before he joined the Stewart company at Cleveland two years ago.

W. H. Schmelzel, president of the Schmelzel Co., St. Paul, Minn., has sold his interests in that concern to his associates and is in the South for his health.

S. Gordon Hyde resigned his position as advertising manager of the Buda Co., Harvey, Ill., effective April 1. His future plans are not announced.

C. A. Woodruff has joined Briscoe Motors, Inc., Detroit, Mich., as director of purchases. He was formerly purchasing agent for the Chalmers, Saxon and Liberty motor car companies.

## Doty Treasurer of Globe Motors

W. S. Doty, formerly of the Cleveland Tractor Co., has joined the Globe Motors Co. organization, Cleveland, O., according to an announcement just made by President Charles H. Davies. He has acquired a substantial financial interest, will act as treasurer and have charge of operations. Mr. Doty has had a long connection with the automotive industry and an unusually broad executive experience, which fits him well for his new duties. His connection with the Cleveland Tractor Co., covering a period of three years, was in the capacity of auditor, assistant secretary and assistant treasurer in the order named. During that time he was also a member of the informal executive committee of the company. Mr. Doty's automotive experience also includes two years with the Torbensen Axle Co., two years in charge of the general offices of the Denneen Motor Truck Co. of Cleveland and several years as a retailer and distributor. The Globe Motors Co. has acquired a tract of land in the center of Euclid village and is making arrangements to erect a factory building this spring. Railroad sidings are being put in at the present time. Details of its new speed truck will shortly be announced.

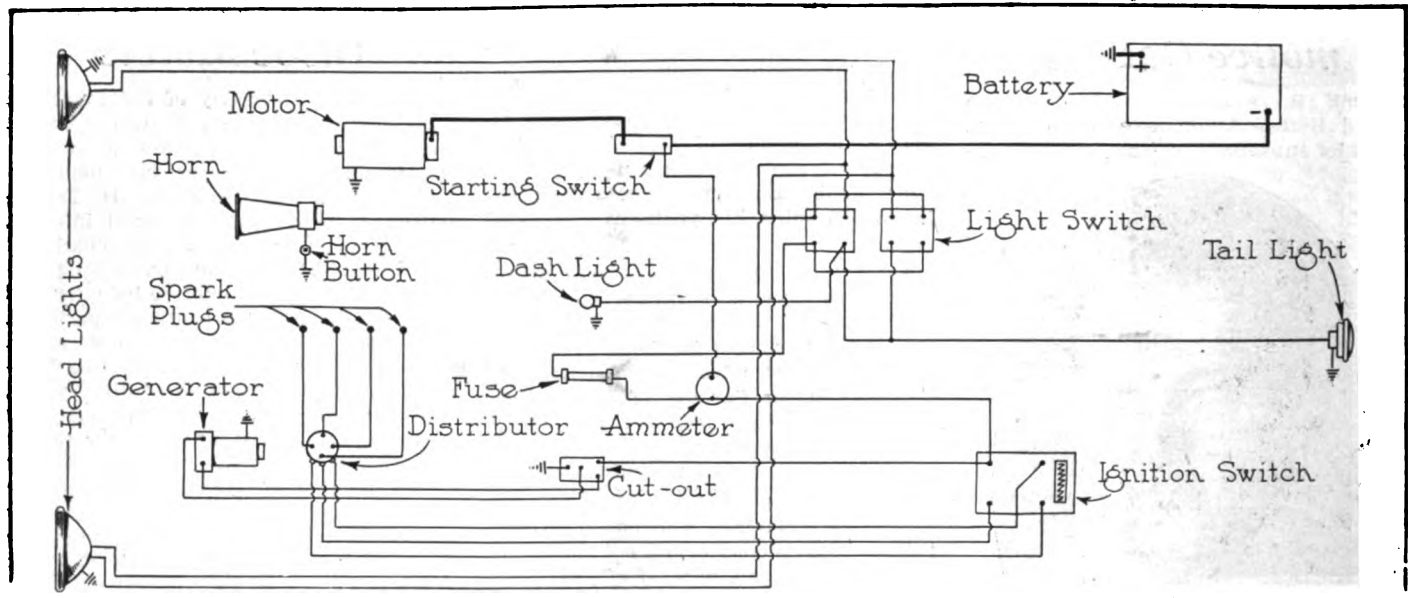
Stephen E. Howell, formerly in charge of the Chicago branch of A. Schrader's Son, Inc., Brooklyn, N. Y., has been promoted to the position of manager of that company's Toronto, Canada, branch. Mr. Howell succeeds Harold R. Cole, who has been transferred to the main office at Brooklyn. Mr. Howell has been a member of the Schrader organization since 1915.

C. H. Brooks, who has been Mr. McMullen's assistant, will be in charge of the business of the Timken-Detroit Co. in that territory.

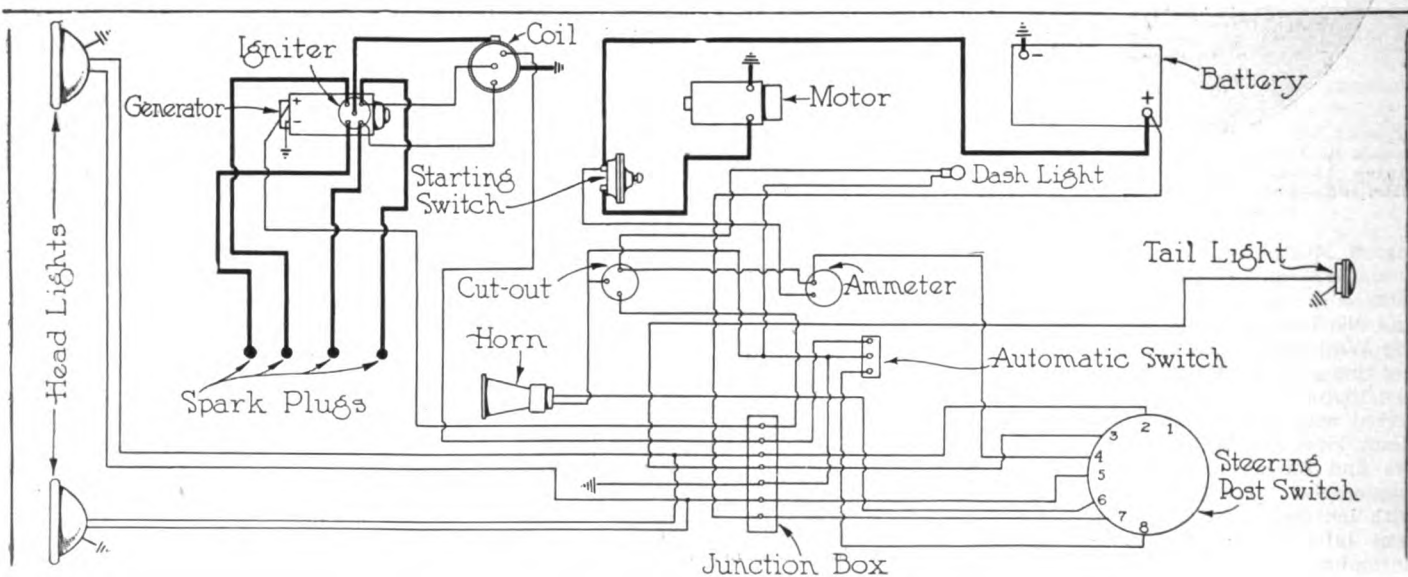


W. S. Doty, New Treasurer of Globe Motors Co., Cleveland, O.

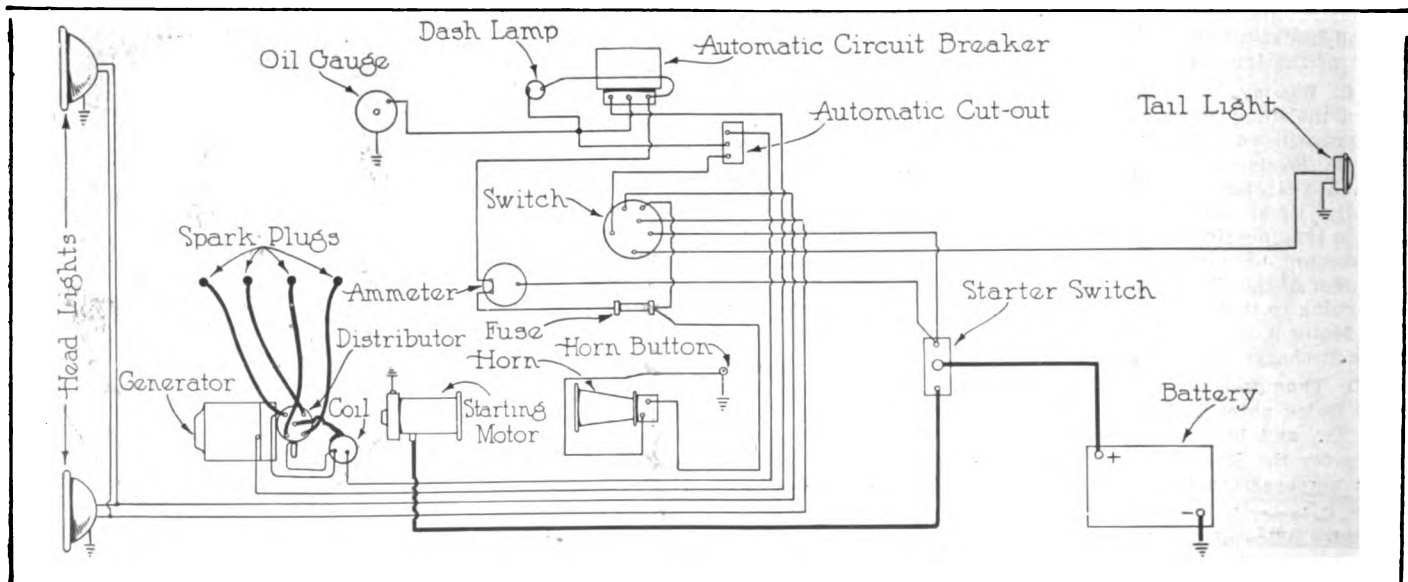
# Monthly Wiring Diagram, No. 15



1917 Allen, Westinghouse Starting and Lighting System.

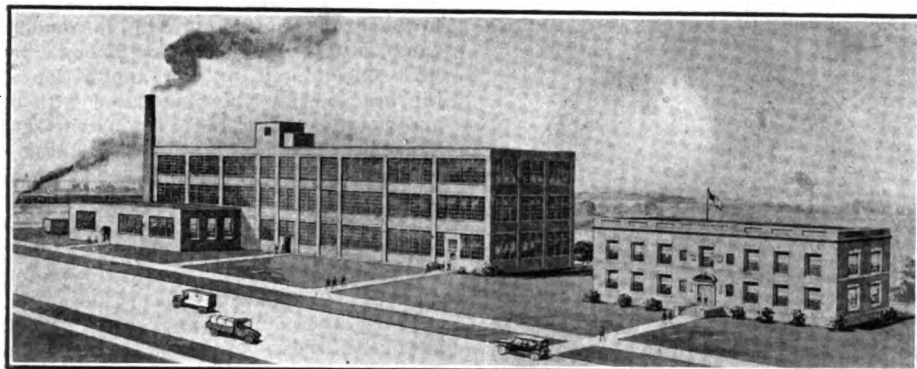
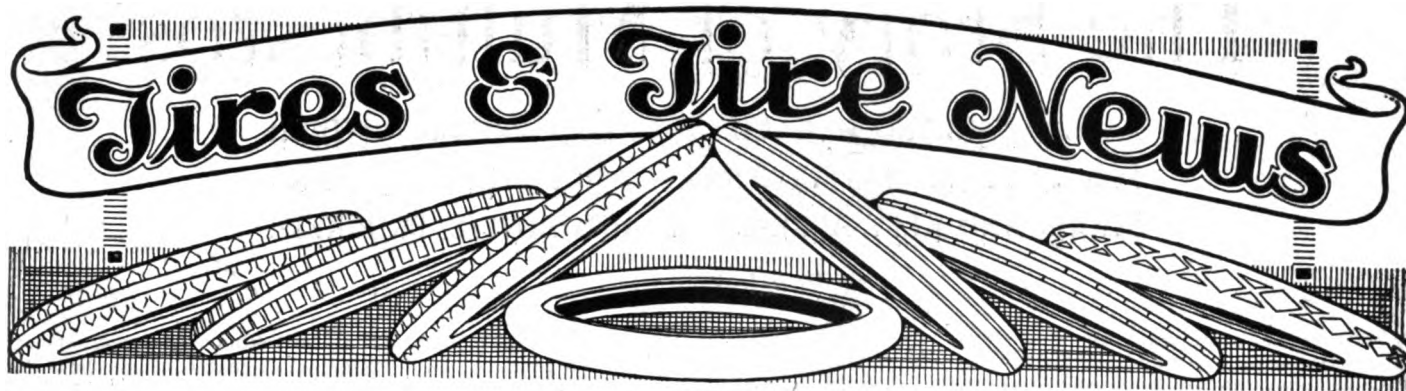


1918 Allen, Model 41, Auto-Lite Starting and Lighting System.



1919-20 Allen, Model 43, Westinghouse Starting and Lighting, Connecticut Ignition.





New Factory of Liberty Tire Corporation at Carey, O.

## Syndicate Assumes Control of Goodyear

A syndicate headed by Dillon, Read & Co., New York banker, has assumed control of the Goodyear Tire & Rubber Co., Akron, O. The New York concern has underwritten \$30,000,000 first mortgage 20 year eight per cent. sinking fund gold bonds due May 1, 1941.

During the life of the bonds the management of the company, with the right to elect a majority of the directors, will be vested in Clarence Dillon, John Sherwin, chairman of the board of directors of the Union Trust Co. of Cleveland, and Owen D. Young, vice president of the General Electric Co., or their successors, through management stock or a voting trust. Some changes in the present personnel are expected.

The syndicate which has underwritten the bonds, includes Goldman, Sachs & Co., which a few months ago made a temporary loan of \$15,000,000; the National City Co., the Guaranty Co., Lee, Higginson & Co., the Chase Securities Co. and Blair & Co. The bonds are offered at 99, and the mortgage provides for the retirement of the entire issue at 120 and interest by drawing by lot \$750,000 on each interest date beginning Nov. 1, 1921.

The proceeds of the first mortgage bonds, together with the proceeds of \$27,500,000 10 year eight per cent. debentures, which will be offered to stockholders, will be used to pay the company's current obligations and to increase working capital. The mortgage provides that the company must maintain at all times net current assets equal to 125 per cent. of the entire amount of bonds outstanding.

Approximately 70,000 stockholders and merchandise creditors assented to the plan for reorganization as presented by the bankers.

## ENLARGEMENT OF LUCERNE PLANT AT TRENTON, N. J.

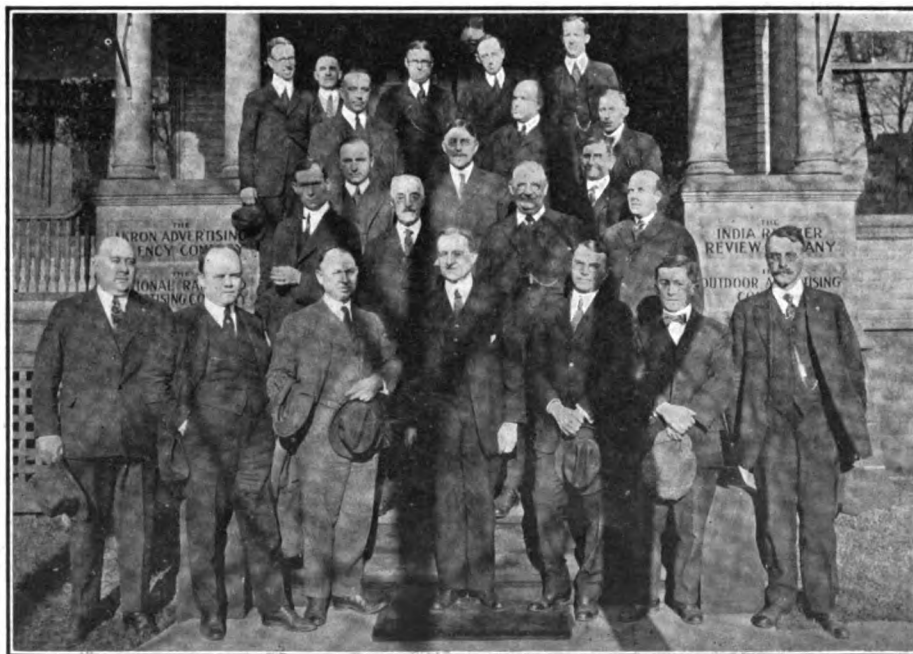
The addition of the plant of the Lucerne Rubber Co., Trenton, N. J., is now under production. This structure is 60 by 90 feet, two stories. The company has also purchased additional land adjacent to provide for future expansion when needed.

## Lambert Tire Directors Dine

On April 18 the directors and stockholders of the Lambert Tire & Rubber Co., Akron, O., held an informal dinner at the City Club of Akron. After the dinner, President H. M. Lambert and Secretary-Treasurer John Hausam told of the excellent condition of the company at present and explained the sales and manufacturing policies for this year. They said that the demand for Lambert "Trublpruf" tires is steadily increasing in all parts of the country and that plans are now under way to largely increase the manufacturing facilities to keep pace with this demand.

Edward S. Babcox, editor of India Rubber Review, spoke on the subject of what the tire industry may expect during the coming year. He was followed by Gordon Cook, president of the Akron Advertising Agency Co., who outlined briefly the sales promotion and advertising plans to be followed by Lambert.

Frank Kesser has become associated with the Vulcan Rubber Co., Philadelphia, factory representative of the Vulcan Rubber Co., Erie, Pa.



Directors and Stockholders of Lambert Tire & Rubber Co., at Their Recent Convention at Akron, O.

# The Story of Multibestos

**A NEW ENGLAND ORGANIZATION AND PRODUCT WHICH FOR 20 YEARS HAS SUCCESSFULLY MET EVERY FORWARD STRIDE AND KEPT ABREAST OF AUTOMOTIVE PROGRESS.**

(By S. G. SWIFT.)

**I**T DOES not seem extravagant to state that few among the many drivers of the 9,500,000 motor vehicles registered in the United States ever give more than a passing thought to the exhaustive tests, and years of research and experiment, that were necessary to produce the efficient brake linings which now make it possible for them to operate their cars with safety to passenger and pedestrian.

Much attention has been paid to the development of the mechanical features of the automobile and truck, and nearly every car owner can give an abstract review of the principles of the power plant, but there are few who know anything about the construction of the all important brake lining. It does its work well, and is accepted for what it accomplishes, but what it is, or how it has been evolved the average person does not know.

the mental library of the educated owner and driver of automobiles and trucks.

In the infancy of the automotive industry which at the present time uses a yearly

ric of different kinds, and leather was also employed. These methods, however, were not satisfactory, as the substance wore quickly and failed to clamp the brake drums satisfactorily. It also became charred and brittle through the heat engendered by the application of the brakes, and when saturated with oil and gasoline was rapidly cut by the sand and dust that sifted onto the surfaces.

As the speed, power and weight of the motor vehicle became greater it was seen that cotton or leather compounds would not do at all, and the industry sought a friction material that would adequately meet its requirements. Engineers tried various compounds and combinations without success, until it was finally discovered that asbestos offered the solution to the perplexing problem.

This mineral has exceedingly great heat resistance, which is the vital principle of construction in obtaining a sat-

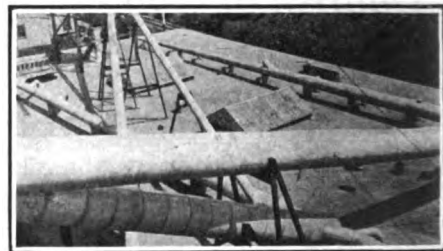


Stoughton Bell, President

total of 60,000,000 feet of brake lining—car builders equipped their machines with brakes of the metal to metal type. This practise was universal, chiefly because no satisfactory facing was then known.

**Fabric First Used for Facing in 1900.**

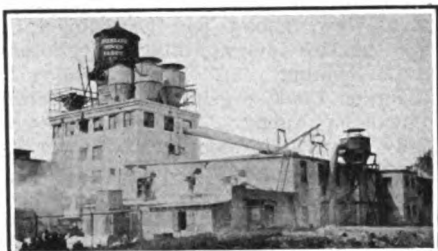
At the beginning of the 20th century automobile brakes were faced with fab-



Rear View of Dust Collecting System.

isfactory brake lining. The real problem, however, lay in adapting it to the purpose in hand. In its original state it was difficult to utilize it as it was found that it readily disintegrated under pressure, and had decided tendencies to glaze and wear unevenly.

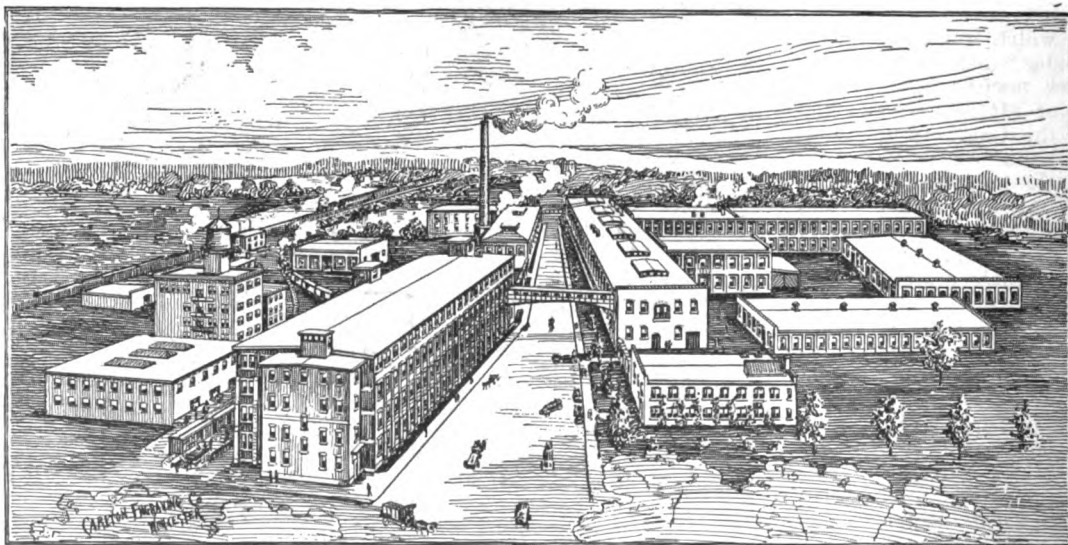
Among those who experimented with the problem of adapting asbestos for brake linings were the engineers of the Multiple Woven Hose and Rubber Co. now incorporated



Front View of Dust Collecting System.

The traffic officer, with a wave of his white-gloved hand, halts the speeding car, and the skilled driver grinds on his brakes and knows from experience that they will hold, though neither he nor the policeman has ever stopped to analyze the reason for the never falling grip that, like a giant hand, quickly brings the machine to a standstill.

But the story of the stiff, black band of rough material is interesting and belongs in



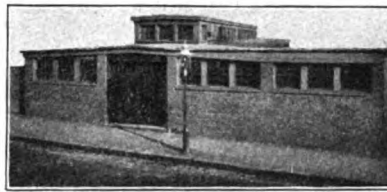
Modern Plant at Walpole, Mass., Where Multibestos, a World Known Product, Is Manufactured.

under the name of Multibestos Co., which in its plant at Worcester, Mass., was engaged in the manufacture of solid multiple fire hose fabrics and solid cotton belting.

#### Company Specially Qualified for the Work.

This company was especially well qualified to undertake work along the lines of development proposed, as its equipment included weaving and treating machinery, and among its personnel of executives were men thoroughly versed in the construction and adaption of special machinery.

After the experiment the engineers employed by the company successfully worked out the practical solution of mak-



The Cradle of Multibestos. Worcester Factory 1910.

band, and does not depend on "stuffers," the trade expression for layers of loose thread placed between outer plies, for the sole purpose of making the material appear thicker than its weave warrants.

#### Features of Multibestos.

In Multibestos the different thicknesses are obtained wholly by the number of solid weaves of the fabric, which makes an interlocking weave of asbestos yarn. The trade generally gives Multibestos the credit of being the pioneer in the asbestos brake lining field, and certain it is that the company was the first to manufacture real asbestos yarn for the purpose.

At the outset the manufacture of brake lining was merely a small part of the business done by the company, whereas today this class of product constitutes more than 95 per cent. of all manufacture. Inasmuch as the automotive industry was in its infancy at the time the company started making Multibestos, it was not thought that the product would ever assume any very large proportions, but as the automobile became more universally used the company was forced by circumstances to keep making a larger and still larger output, and in 1913, having entirely outgrown the Worcester plant, an entirely new factory was erected at Framingham and the business was removed to that location. The new building had 50,000 feet of floor space and was thoroughly modern, being adequately equipped to handle all business that might come, in the opinion of the executives.

But the sojourn at the new plant was of short duration. The business of sup-

plying the world with Multibestos required still larger and better facilities for manufacture, and there came a time when it was imperative that another factory be obtained. With this decision began the third and latest chapter in the story of Multibestos.

#### The Plant at Walpole.

While considering the addition of new buildings at Framingham sufficient to triple the capacity of the factory, it was learned that at Walpole, Mass., about 15 miles away, was a highly organized and comparatively new plant, peculiarly suited to the manufacture of brake lining and mechanical rubber goods, the company at that time manufacturing a line of the latter product.



John C. Donnelly, Sales and Advertising Manager.

ing asbestos suitable for brake linings by weaving it on special looms, in combination with brass strands, and they also compounded special formulae for treating the fabric.

As a result it began the construction of Multibestos, a brake lining that is said to be standard equipment for more than 60 per cent. of all cars manufactured in the United States. The demand for the material has fully kept pace with the immense growth of the automobile industry, and it is conservatively estimated that at the present time Multibestos is sold by most of the 40,000 garages and supply houses in America, and is supplied as renewal equipment by 25,000 repair shops when specified. The product also enjoys a healthy sale in foreign countries.

The basic reason for the success with which the product has been acclaimed, is partly suggested in the name. Multibestos is a coined trade name, the first half of which implies that the fabric is of multiple, or many, weaves, while the last half suggests the asbestos from which it is made. By multiple weave is meant the solid weave by which every thread is tightly bound in a solid mass, having no loose plies to break under the stress of suddenly applied brakes. This manner of weaving makes one piece of the



Photo by Bachrach.  
E. O. Christiansen, Treasurer and General Manager.

This plant, comprising 175,000 feet of floor space, and including 75 acres of land available for future expansion, had been developed for the Walpole Tire and Rubber Co., which had ceased operations. Recognizing the opportunity the company purchased the property, and abandoned the idea of enlarging the Framingham plant, as sorely needed production could be started at the Walpole plant immediately, which would not have been possible had the proposed additions been built at Framingham.

The present Multibestos factory, ideally suited for the purpose in hand when purchased, has been further improved, and today contains the finest possible labor saving equipment that could be devised by engineers who have been allied with the different stages of manufacturing improvement for more than 20 years. The plant is ideally located in a town renowned for its skilled labor, and has unusual shipping facilities, being adjacent to two railroads, one of which runs within a few feet of the property.

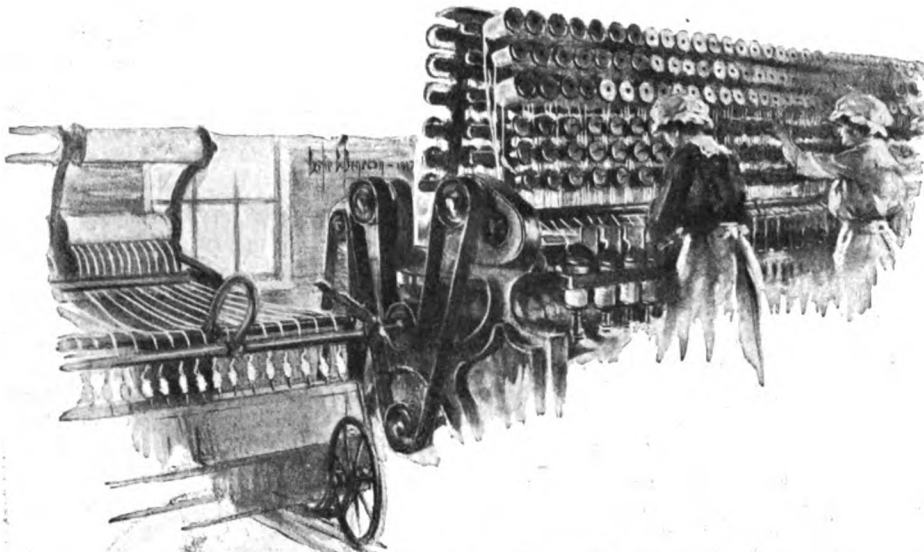
#### Processes in the Manufacture of Multibestos.

The process by which brake linings are manufactured is very interesting. The asbestos rock used by this company is especially mined and comes from a



Thomas J. Daley, Secretary.





Multibestos Is Woven on Heavy Narrow Fabric Looms.

small area at Thetford, in the province of Quebec. It is first crushed between heavy rollers, after which it is carefully screened to free it from grit and foreign substances. The cleaned stock automatically passes into a small room at the rear of the screening department, and is then blown through a large pipe to the second floor, where the carding machines are located.

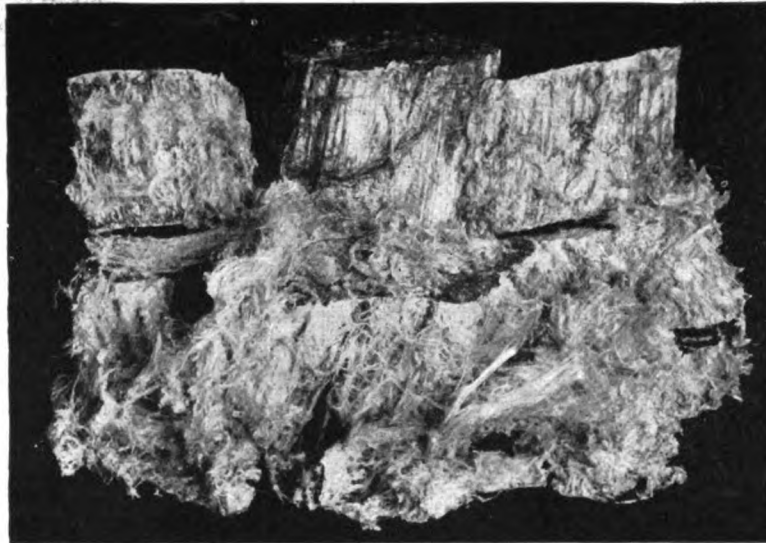
The carding equipment, which does much to metamorphose the rock into the yielding fabric, is of standard design, and is similar to that used in the cotton and woolen industries. Briefly, this carding of the fibers consists in their being passed through rapidly revolving rollers with wire teeth, which causes them all to lie in the same direction, after which they are spun into the soft yarn known as "roving."

This loosely spun yarn, having little about it to remind one of the rock from which it was made, now goes to a mule spinning frame, where it is twisted into stronger yarn. The next operation is that of combining the asbestos yarn with brass wire. This is done by means of special machinery, and gives added tensile strength, which assures a firm bond for holding in place by riveting.

The finished yarn is next woven. This part of the manufacture is done by means of heavy, narrow fabric looms, which are so made as to admit of the weaving of a number of belts or strips at the same time.

An idea of the flexibility of these looms and their capacity can be gathered from a study of the various dimensions of the fabric turned out. As Multibestos is used as brake and clutch linings in every kind of motor vehicle, including airplanes, and is also extensively used in the manufacture of certain units connected with heavy hauling, it follows

that a wide variety of sizes is necessary. These various sizes are gained by hav-



The Crude Asbestos Closely Resembles Vegetable Fiber.

ing the looms so made as to be adjustable, and materials may be woven on

them varying in thickness from  $\frac{1}{8}$  to  $\frac{3}{4}$  inches, and by  $\frac{3}{4}$  to 20 inches, cross measurement. This variation is obtained solely by increasing the number of threads, and not by artificial padding or stuffing.

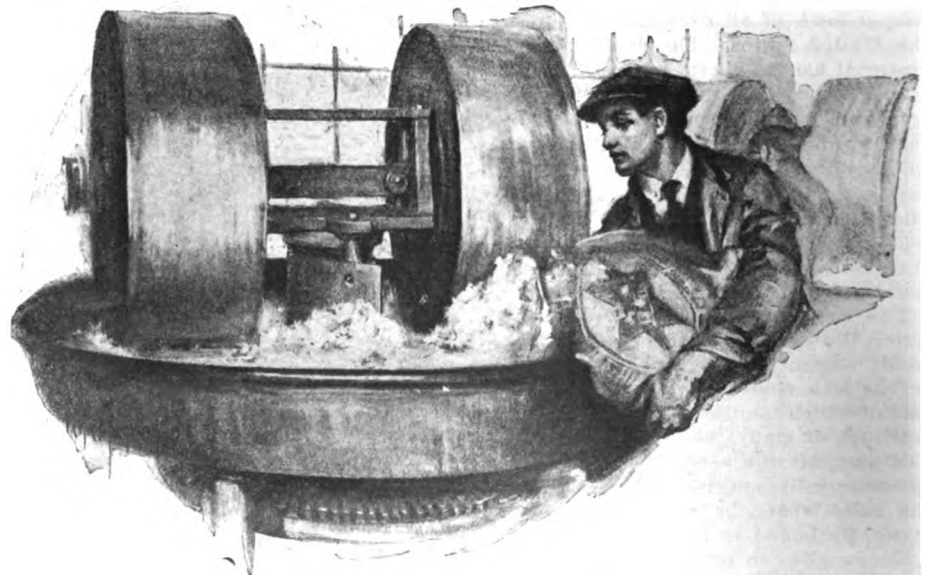
One of the manufacturing economies that the makers of Multibestos employ in obtaining quantity production is the method of feeding the yarn to the looms from "beams" or huge metal spools. Multibestos Is Treated with Chemical Bath.

As the fabric is woven it is automatically wound onto reels for convenience in handling, and is then sent to the treating department, where it is immersed in a special chemical compound which permeates every fiber and makes the fabric impervious to heat, dust, water, oil and grease. At this point the processes of making brake linings and clutch linings differ somewhat.

The reels of fabric are placed on revolving axles and fed into the baths, that which is intended for brake linings going into one solution, while the clutch linings are dipped into another. After a long treatment in the impregnating bath the rolls of fabric are placed in the drier which is directly behind the baths.

From this department the fabric is fed through gravity elevators to the calender and stock departments on the ground floor. This process, which consists of pressing the fabric between heavy steel rollers, is coupled with a stamping device, which stencils the name "Multibestos" on the material and also stencils white marks at lengths of every foot. These marks not only identify the material as Multibestos, but are also a great

help to the dealer in dispensing the product.



Heavy Rollers Separate the Asbestos Fibers.



From the time Multibestos, as raw material, is received at the factory until the finished fabric is packed for shipment, it is constantly subjected to rigid inspections. While being fed into the treating compound every inch of the material is reinspected, as it unrolls before the watchful eyes of the inspectors. Other men watch it just as closely as it comes from the elevators to the calendaring department, and the men in charge of the calendaring and stenciling process again inspect it. The final inspection of all comes when the finished product is sent to the stock room, where the clerks inspect each individual roll to see that the markings and trade-mark have been properly recorded.

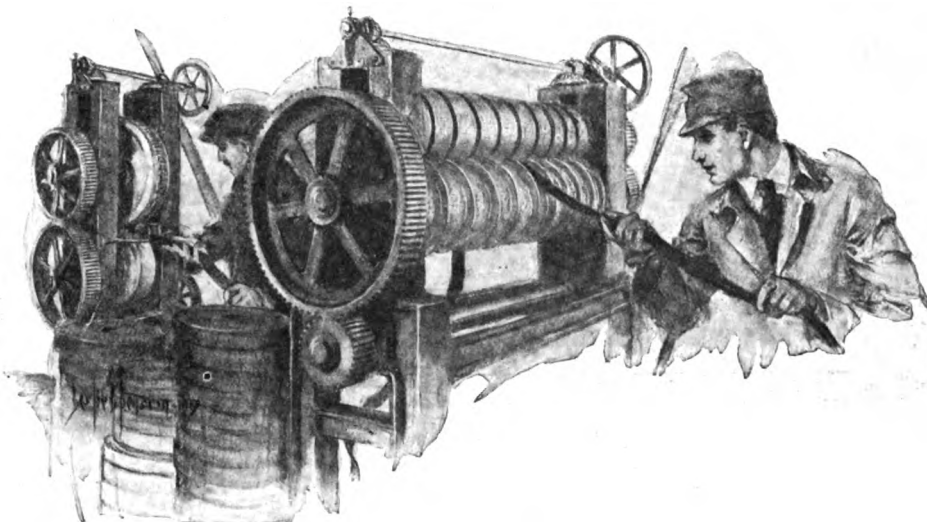
#### High Quality of Multibestos Assured by Constant Tests.

The unvarying quality of Multibestos, in-built as the result of basic experimental tests, is kept at a continuous high standard by laboratory tests of a special nature. These tests are most exhaustive and show the manner in which the lining stands up under actual road tests.

The Multibestos company also manufactures disc and cone clutch linings, transmission linings for Ford cars and brake blocks and shoes for heavy hoisting machinery.

President Stoughton Bell, to whose untiring efforts the company's success is mainly due, has well defined ideas on the subject of selling and has surrounded himself with officials who believe as he does.

In setting forth the principles of the company Mr. Bell in a recent interview said, "Multibestos and the company behind it stand for quality and service. Quality of organization, quality of men and quality of product. Service like charity, begins at home. We must render first, one to another, man to man and department to department. Only then can we serve our customers and the public. Quality and service are built



Calendaring the Finished Product and Stamping Trade Mark.

on honesty and frankness. As we are sincere and honest one with another, so shall we be with those with whom we do business. The policy of the company is based on definite honesty standards. These standards are now and must always be in advance of past achievements, but our aims must not be so high that they cannot be attained within the time and under the conditions set for their accomplishment."

The phenomenal growth of the Multibestos company is accounted for by its policy of fair dealing. There is no doubt but what any other product, given equal merit, would show similar growth under the same policies pursued by the company, and no one hesitates to give due credit to its efficient personnel of executives, which is as follows: President, Stoughton Bell; treasurer and general manager, E. O. Christiansen; assistant treasurer, C. W. Bunker; secretary, T. J. Daley; sales and advertising manager, J. C. Donnelly; superintendent, T. H. Bateson; purchasing agent, J. Posternock.

Multibestos, like many another automotive product, is not sold direct to the dealer, but is handled through jobbers. The company has branch offices and salesrooms in Chicago, New York, Kansas City and Chattanooga, and its salesmen cover every state in the Union.

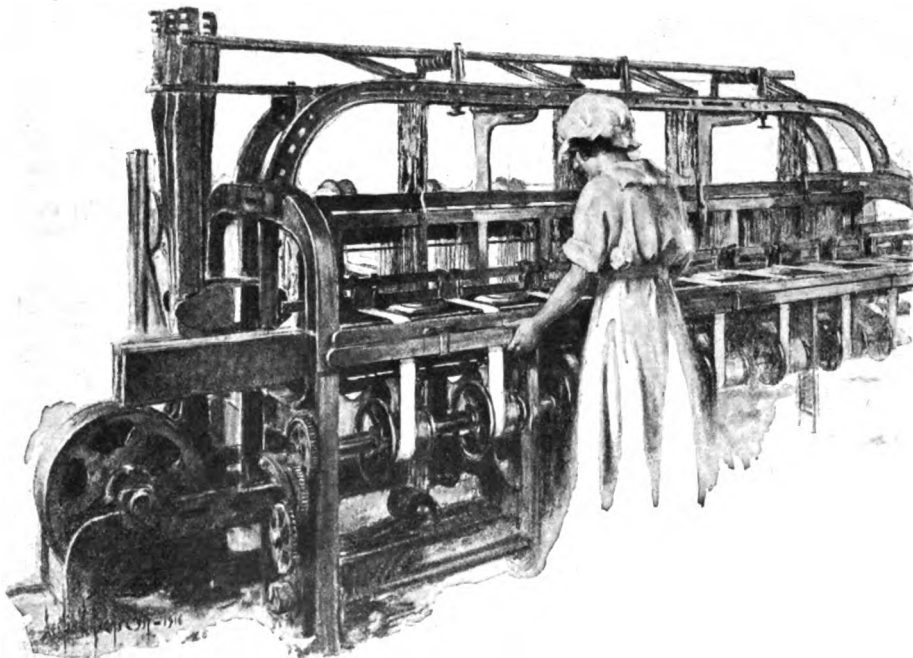
#### PRIMING MADE EASY.

While such troubles are more prevalent in winter than in summer, it sometimes happens even in warm weather that it is necessary to prime an automobile engine to get it going, and the motorist may be without a container at hand for the necessary gasoline. When such difficulties arise there are several methods that can be employed.

If the engine is equipped with petcocks on top of each cylinder, priming is very simple. Take a handkerchief and drop one end down into the gasoline tank allowing the handkerchief to soak up what gasoline it will while you are holding the other end. Remove it when filled and hold the dripping end over the top of the open cocks, enough gasoline will drip off the handkerchief to prime the cocks, and by squeezing it at the last you can get practically all of the gasoline out of the handkerchief. This may have to be repeated two or three times before enough gasoline is obtained to start the engine. After the engine is primed and running, do not put the handkerchief back into the pocket, but leave it somewhere in the air so that the gasoline will evaporate. If put in the pocket, the gasoline soon soaks through the clothing, reaching the skin and causing it to blister.

#### FOR THE WOMAN CAR OWNER.

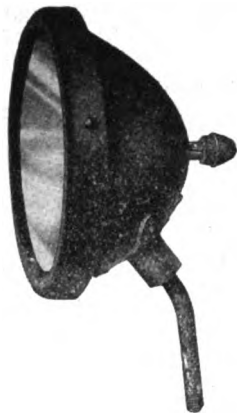
Women who work about their cars cleaning plugs, filling the oil reservoir, changing tires, etc., will find a large kitchen apron fastened in the back and buttoned tight around the wrists convenient and serviceable, as it completely covers the street clothes. In this, together with sandals to cover the feet, an old pair of gloves and a cap fitting tightly over the hair, they will be entirely protected from dirt and grease.



Twisting and Spinning the Crude Asbestos Fiber.

# ACCESSORIES DEPARTMENT

The K D Model No. 6 Head Lamp is suitable for all models of Ford cars manufactured since 1915 and has a special one-bracket support. The reflector is pressed from brass, polished and silver plated and fastened securely in the body of the lamp, no springs being used. The body is made from heavy gauge steel with two coats of enamel baked on. The bulbs are nine-



volt, 18-candlepower double-wire system.

A type, No. 6-2, is also made with dimmer bulbs for use on late model Ford cars. The large bulbs are 6-3-volt, 15 candlepower and the small are 6-2-volt, two candlepower; both single-wire system. The diameter of the door is nine inches.

Manufactured by the K D Lamp Co., Cincinnati, O. List prices, No. 6, \$7.50; No. 6-2, \$9.

The Security Auto Lock is approved by insurance companies and Underwriters and is stated to reduce insurance cost at least 15 percent which soon pays for it in this saving alone.

It can be installed in 10 minutes (at the most) and once on it cannot be taken off without the key, and will not get out of



order. No changes to make on the machine, no filing to do, no holes to drill; all that is necessary is to screw it on.

Before the car is left the key is inserted and turned in the lock, and the steering wheel is lifted; the key is then taken out

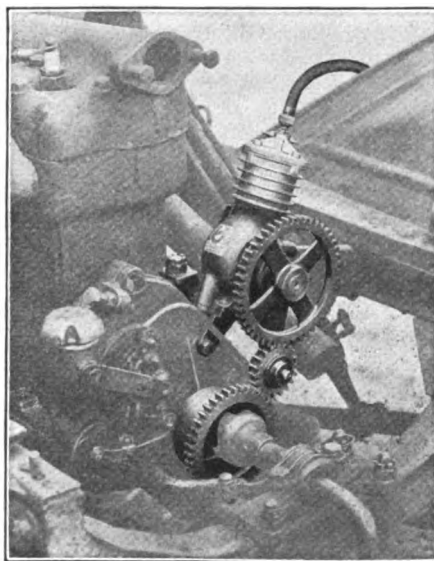
and the car is locked. This allows the steering wheel to spin around like a top and the front wheels of the car to be "wild."

When the owner wants to drive off, he gives the key a turn in the lock the steering wheel comes into play again.

The Security Auto Lock is made of highly nickelled, excellent quality, strong and heavy brass. It is equipped with a positive working non-pickable lock, with two keys. In appearance, it presents one of the handsomest lock designs on the market. It fits under the steering wheel, by far the most convenient place for a lock.

Manufactured by the Security Auto Lock Co., 410 North Paulina Street, Chicago, Ill. List price, \$7.50.

The Universal Automobile Air Pump is shown in the accompanying illustration in use on a Ford car. This can be installed in a few minutes' time and is very reasonable in cost. It inflates the tires quickly with the right amount of clean, pure air and automatically cleans itself at each operation. This not only saves the labor, time and vexation of performing this operation by hand, but it is also an actual economy in the service of the tires in



that there is no excuse for running the car with the tires improperly inflated.

The pump becomes a permanent part of the car, being attached to the motor or frame by a suitable bracket furnished with the pump. After being attached to the car the pump is started by shifting the gear on the pump crankshaft to engage it with the gear on the magneto or pump shaft and the air is delivered to any of the tires by a hose connected to the air pump. A split gear is furnished for the driver which is clamped around some moving part of the motor—usually the pump or magneto shaft.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The pumps are equipped with an automatic relief valve which is set for the proper pressure and sounds a warning signal when the tires are up to the proper pressure. When they reach that point no more air can enter the tire. This does away entirely with a gauge on the hose line.

Universal pumps are manufactured for many of the most common makes of cars and also a heavy duty type for garages and service stations.

Manufactured by the Universal Air Compressor Co., Brookside avenue, at 11th street, Indianapolis, Ind. Prices and literature will be sent on application. A special offer is made to dealers and jobbers.

A New Protex Signal is being marketed that may be used with satisfaction on a motor truck, warning the driver of a following vehicle of the intention of the truck operator to stop or slow down. The



device is mounted on the left rear fender and when the brake pedal is pressed down a suitable warning light in the signal shows the word "Stop" distinctly on the signal glass. It is equally adapted for day or night driving.

Manufactured by the Protex Signal Co., Park Building, Cleveland, O. Literature and prices on request.

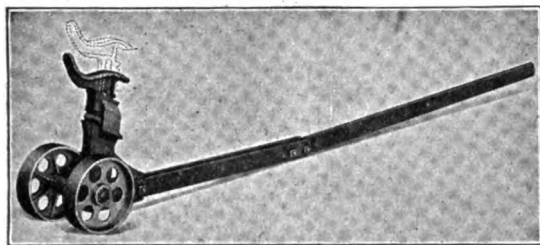
The Radiatometer is a patented device with which it is claimed to be possible to test the non-freezing solution in a radiator before starting up the car in the morning, in order to know accurately what the percentage of solution in the radiator is, so that if found necessary more solution may be added to prevent freezing.

A long, flexible rubber tube affords easy access to the radiator solution, a ring guide float insuring a perfect test of the density of the solution. An easily understood chart accompanies each instrument, making it possible for the motorist to tell whether the solution is of sufficient strength for the temperature to be encountered.

Manufactured by the Beckley-Ralston Co., Chicago, Ill. Prices and literature on request.

The No. 3 Hovey Jack is designed to combine the principles of durability, strength and speed, as well as appearance, at a low price. It is so constructed that it can be used under a rear axle equipped with a truss rod without any interference. It has an improved locking principle, overcoming any possible danger of the handle flying up until lifted by the operator. The handle is so designed that it clears the floor at its extreme end sufficiently to allow plenty of hand room. There are no spring or delicate parts to get out of order.

Method of operation: To raise the car, merely kick up the movable head to the



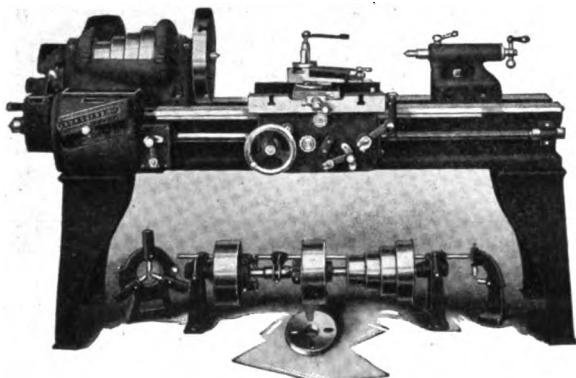
desired height, roll under the car and push down on the handle. To lower the car, raise the handle.

The No. 3 Hovey jack has six-inch malleable wheels with 1½-inch faces, and a 60-inch round-edge bar stock handle. All the working parts are steel. It can be adjusted to pick up a load three inches from the floor, or high enough to reach the axle of any car.

Hovey jacks are guaranteed against defective material and workmanship. The weight is 35 pounds.

Manufactured by J. H. Whetstone & Co., Lapeer, Mich. List price, \$15; west of Rockies, \$16.50.

The Carroll-Jamieson New 14-Inch Quick Change Gear Lathe, with either single or double back gear, is shown in the accompanying illustration. It has a 15½-inch swing and is guaranteed to meet all the requirements of the up-to-date garage, service station or tool room, and will manufacture parts up to the full capacity of any 14-inch lathe. It is



equipped with the maker's patented quick-change gear box, cutting threads from three to 64 per inch. One handle and knob does it all.

Convenience and durability combined with accuracy and simplicity are some of the good points claimed for the Carroll-Jamieson lathe.

All standard and odd threads can be cut up to 64 per inch, including 11½ inch pipe threads, right or left hand. The gearing in gear box is made from bar steel running on hard studs and supported by two walls.

The apron has a reverse for feeds and is provided with an interlocking device—preventing any two feeds being engaged at the same time. The power cross feed and longitude feed are friction, the most approved design for engine lathes. The new clamping device which secures the carriage to the bed when facing off work, maintains the accuracy of the lathe and

no strain is applied to the corners of the carriage.

The head is massive and well proportioned and fitted with reverse or right and left hand screw cutting. The bearings are phosphor bronze hand scraped to fit the spindle. The spindle is made from a high carbon special spindle steel ground on the most improved grinding machinery, having a 1¼-inch hole its entire length. Taper center bush reamed to No. 8 Morse taper.

The face gear and cone pulleys are locked with a spring pin, which is adjusted when using the back gear without the use of a wrench. The cross feed and compound rest screw are graduated to read into thousandths. The compound rest swivel is graduated to 360 degrees and as will be noticed the tail stock is cut away, allowing same to be swung around to 90 degrees.

Taper gibs are used in both the cross slide as well as compound rest. The carriage is gibbed both front and back. Each machine is furnished with large and small face plate follow rest, steady rest, compound rest, centers, wrenches and double friction countershafts and thread indicator.

Attachments that can be had with this lathe include milling and keyway cutting attachment, taper attachment, patented increase swing attachment, draw-in chuck attachment. Special garage equipment, including lathe tool holders, cutting off tools, boring tool, chucks, lathe dogs, etc., furnished at small additional cost.

Manufactured by the Carroll & Jamieson Machine Tool Co., Batavia, O., who will supply full details, prices, etc., on request. Special propositions from dealers are also solicited.

The Eveready Standard Lunch Kit offers, in compact, convenient and inexpensive form, a complete automobile and outing lunch set, which is especially constructed with regard to service and durability to please the most discriminating taste. The case is of three-ply veneer basswood and the frame is covered with wear resisting black enamelled cloth. It is 18 inches long, 12½ inches wide and 5½ inches deep; is reinforced with metal corners, has a Corbin spring lock with two strong spring catches and a hand turned leather handle fastened securely with steel loops. It is lined throughout with washable Sanitas fabric. On the inside of the lid of the case are loops, for holding knives, forks and spoons, made of Fabrikoid, firmly sewed to the cover. The partitions of the compartment of the case itself are grooved into the walls. There are special compartments for a quarter size vacuum bottle, lunch box, drinking cups and salt

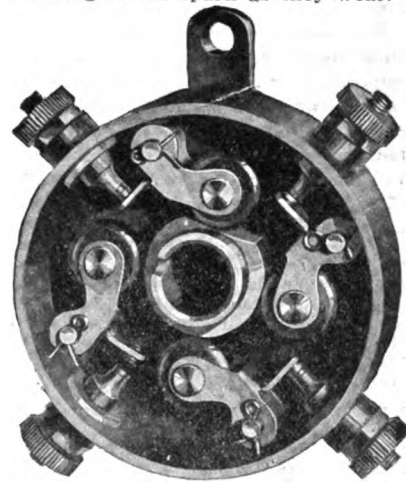


and pepper shakers.

Each kit affords a complete service for six people and contains six nickel plated, steel knives, six solid cast, pure aluminum forks, six solid cast, pure aluminum tea spoons, six solid cast, pure aluminum serving spoons, six white enamelled drinking cups, one pair of aluminum salt and pepper shakers and one lunch box.

Manufactured by the Ben S. Loeb Co., 200 Fifth Avenue, New York City. Price for basswood case (shown in cut), \$16.50 complete; black fiber case, \$11.50.

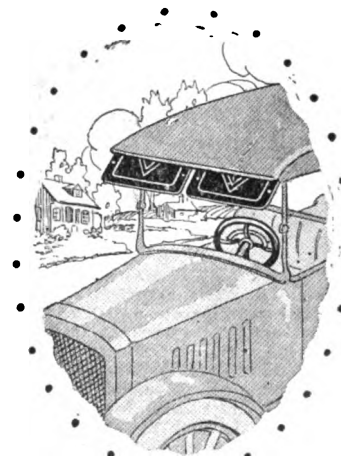
The Fansteel Magneto Break Timer is designed for use on Ford cars, trucks and tractors. It has heavy tungsten points; is of rust-proof construction, as the parts are heavily coppered and the housing is covered with shellac; is designed to obviate oiling, as contact is not made through a rotating part; there are no wipe contacts to wear out the timer and change the timing of the spark as they wear.



The maker guarantees that any difficulty which may arise, due to defective workmanship or material, will be adjusted at his expense.

Manufactured by W. J. Walsh, 528 Monadnock block, 53 West Jackson Boulevard, Chicago, Ill. Price, \$6.

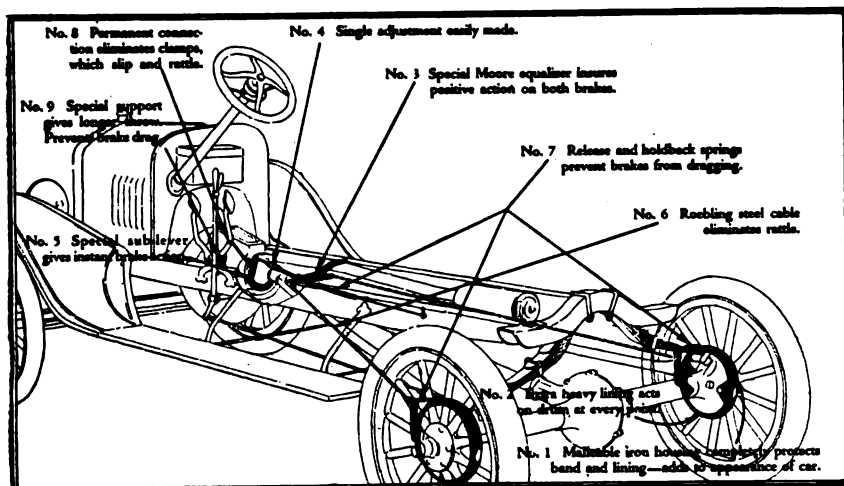
The Code Twin Visor is especially designed to protect the car driver from sun and glare, rain and snow and, as will be noted from the illustration, they add an element of ornament to utility. They are made of pressed steel, black enamel finish, with nickel trimmings. They will fit any car, are adjustable to any angle and their installation is very simple. They are absolutely guaranteed not to rattle or buckle. Made only in one size, but are adaptable to any open or closed car.



The maker will supply, free, to dealers, an effective counter display equipment.

Manufactured by the Code Manufacturing Co., Ltd., 1329 West Lake Street, Chicago, Ill. List prices: Double set, \$5; single, \$2.50 each.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Moore Rear Wheel Service Brake is especially designed for use on Ford cars. Acting directly on the external surface of the regular Ford brake drum, located on the rear wheels, the Moore brake eliminates all chattering, jerking and vibration.

From the standpoint of economy the Moore brake offers the Ford owner a real definite saving in that the average life has been over three years for each set of linings. The drawing of the Ford chassis shows the Moore brake installed. It operates from the original brake pedal, transmitting the braking power directly to the rear wheels, instead of rods,

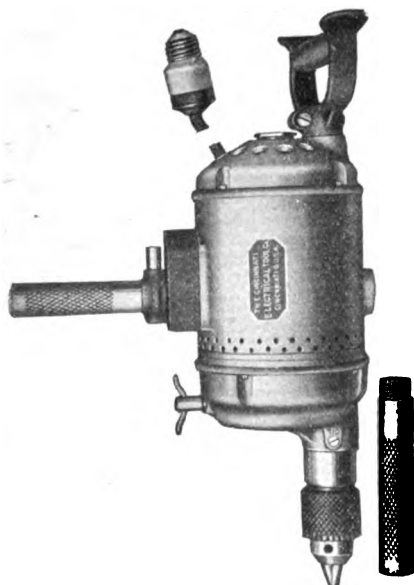
stranded steel cables are used from the equalizer back to the brakebands. Cables cannot rattle—they do not stretch or come loose.

The Moore brake is easy to operate. It takes hold firmly and positively with the slightest pressure on the pedal. It increases the braking surface 140 per cent. for the passenger car (470 per cent. for the truck)—hence the same braking power is derived from less pressure on the pedal.

Manufactured by the Tractor-Train Co., of Indiana, Connersville, Ind. List price, \$18 a set. Particulars relative to dealers' and jobbers' proposition supplied on request.

The Cincinnati One-Half Inch Capacity Two-Speed Drill, which is fast becoming popular in garages, machine shops, and service stations is shown in the accompanying illustration.

The two-speed feature of this drill makes it an especially practical tool for



and long life. They operate in grease and are fully enclosed in the gear case at the chuck end of the motor. They are separated from the motor windings by an aluminum plate which prevents oil and grease from getting into the windings.

High-grade annular ball bearings support both ends of the armature shaft, assuring perfect alignment at all times, giving positive drive and reducing friction load to a minimum.

The drills are of the off-center type, one side handle being detachable for close corner drilling.

Cincinnati drills are made for from one-quarter inch to two and one-half inch capacity in steel, wound for direct or alternating currents, or with Universal motor for either current. The two-speed feature is standard on all drills of one-half inch, three-quarter and seven-eighths inch capacity.

The same concern manufactures a complete line of portable electric drills and grinders, including tool-post, bench, floor, hand and aerial types.

Cincinnati drills are durable, powerful and compact with no complicated parts to get out of order. Every machine is tested to its rated capacity in steel, with an overload allowance, and is guaranteed mechanically and electrically.

Manufactured by the Cincinnati Electrical Tool Co., 1501-5 Freeman avenue, Cincinnati, O. Garage owners, repair men and dealers are invited to write for complete catalogue, prices, etc.

allround work. The speed is changed by shifting the wing nut, and can be done while the drill is running without any possibility of stripping the gears.

The drill carries a Universal motor for either direct or alternating current. Standard windings are for 110-125 and 220-250 volts. It can be operated either from a lighting or power circuit.

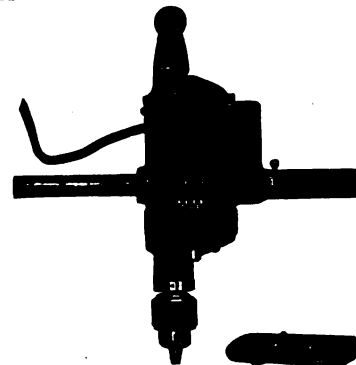
Aluminum housings and end caps make the drill especially light in weight. The switch is of the quick "make and break" type, easily operated through one of the side handles. The gears are made of special analysis high-grade steel, heat-treated and hardened to insure durability

The Willey Portable Electric Drill No. 1-LL shown herewith is typical of 10 sizes of drills manufactured by the James Clark, Jr., Electric Co. It is a two-speed drill that is particularly adapted to garage use. It is equipped with a chuck which will take all drills up to one-half inch. Features applying to all drills are: Bodies and heads of number twelve aluminum alloy; windings insulated for 1000 volts; reliable switch proved by twenty years of service; accessibility for cleaning and repairs; no wiring of any kind need be disturbed in cleaning and inspecting; ball bearings used throughout except in a few places where hardened steel on hardened steel

(When Writing to Advertisers, Please Mention the Automobile Journal.)

better serves the purpose; finish and workmanship unsurpassed; all parts interchangeable.

This company also manufactures electrically driven grinders for different purposes.



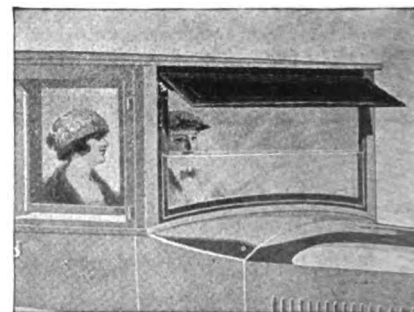
All Willey tools are stated to more than meet the requirements of the American Institute of Electrical Engineers, the Electric Power club and United States Navy.

Manufactured by the James Clark, Jr., Electric Co., 520 West Main Street, Louisville, Ky. Garagemen are requested to write for catalogue, prices, etc.

The Troy Sunshade Visor is characterized by that "built in" look that really improves the appearance of the most carefully designed automobile body or the handsomest plate glass windshield. It lends coziness and comfort to the interior of any closed or open car.

At home on the finest cars the Troy Sunshade Visor is equally adaptable to the less pretentious models. It was designed to conform with rules laid down by modern body engineers. Its very appearance shows the thought and care, as well as years of experience behind its design and construction.

It is a product of the factory that has for years been a leader in the design and manufacture of high grade windshields.



continually in close touch with leading car and body manufacturers. Every possible demand that can be made upon a visor are claimed to be met by it.

Simplicity of construction, ingenious operating and attaching fixtures, no brackets in line of vision at either side, flap and gutter for rain protection, no parts to become loose or rattle, handsome and durable cover—these features are combined in the Troy Sunshade Visor.

The Troy Sunshade Visor has a light, but rigid frame of U-shaped steel electrically welded. It is covered with Du Pont Double-Texture Raynite fabric, well padded to prevent wrinkling or sagging. These features help keep the rain from dripping or blowing on the windshield.

The ingenious fixtures permit of adjustment to suit the driver's convenience. They hold the visor firmly in place under all conditions. They set close up with nothing on either side to increase the "blind spot" or interfere with vision. It is attractively finished in brush-applied, baked enamel with nickel-plated wing nuts.

Manufactured by the Troy Sunshade Co., Troy, O. Prices on request.

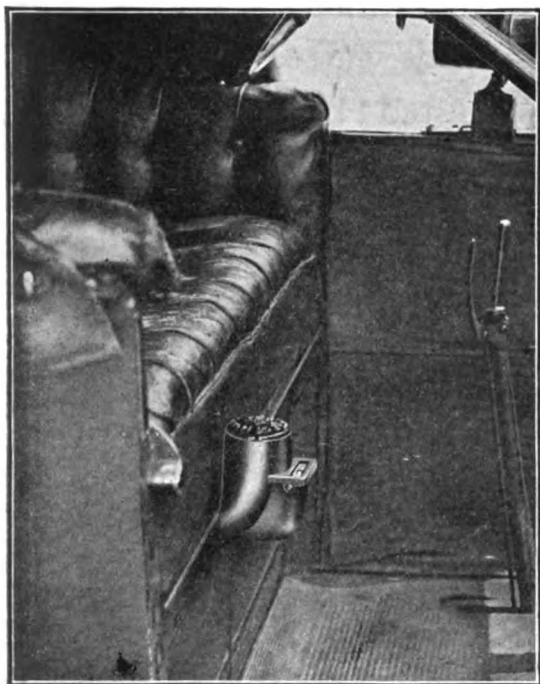




### GO-ITE GASOMETER FOR FORDS AND CHEVROLETS.

An accessory for Ford and Chevrolet automobiles that is attracting widespread attention both among dealers and car owners is the Go-It Gasometer, a combined gasoline filler and gauge. This device fits snugly under the cushion of the front seat of either of these makes of automobiles.

It eliminates the necessity of getting out of the car lifting the seat cushion and measuring the gasoline. The special air vent prevents flooding while the tank is being filled. It is said to be the only combined gasoline filler and gauge on the market for these cars. It tells the driver just the amount of gasoline in the tank at all times and allows the tank to be



Go-It Gasometer, a Combined Filler and Gauge.

filled in a half minute with no inconvenience to any passenger in the car.

The Go-It Sales Co., Kokomo, Ind., has been formed to handle the distribution and sales of the Go-It Gasometer.

Included in the personnel of the organization are the following: President, D. T. Hersey; vice president and sales manager, T. P. Nickell. Mr. Hersey was formerly sales manager of the Vulcan Spring Co., Richmond, Ind., and assistant general sales manager of the Splittorf Co., Newark, N. J. Mr. Nickell was also formerly connected with the Vulcan Spring Co. in the capacity of sales manager and New England manager for the Splittorf company.

The Go-It Gasometer is manufactured by the Go-It Manufacturing Co., Kokomo, Ind. Jobbers and dealers' proposition will be furnished on request.

American automotive industrial and trade interests will be interested to learn that two concessions have been granted for the erection of buildings for the Peruvian Centennial at Lima, Peru, during the months of July, August, September and October, 1921.

## Reorganization Plan for Standard Parts

A strong and permanent financing plan for the Standard Parts Co. of Cleveland, O., was approved at a recent meeting of the creditors of the company.

The plan which had already been approved by the reorganization, stockholders' and creditors' committees, contemplates a new company to take over the Standard Parts properties. This company will issue \$6,500,000 first mortgage eight per cent. notes and 100,000 shares no par common stock. These securities will be accepted by the creditors to cancel in full the outstanding indebtedness, amounting to about \$10,000,000. Stock-

holders in the old company will be allowed to buy the notes at par and also to buy the no par common stock at about \$35 per share privilege of payment being extended over a period of nine months. The company's assets as a going concern are held at approximately \$25,000,000, as against the \$10,000,000 of indebtedness mentioned.

It is planned to accomplish this reorganization as quickly as the necessary legal details incident to the receivership can be worked out. The present management will be continued, operating the following plants: The Perfection Spring Co., Cleveland, O.; the Pontiac Spring Co., Pontiac, Mich.; the Standard Welding Co., Cleveland, O.; the Bock Bearing Co., Toledo, O.; the Eaton Axle Co., Cleveland, O., and the Canton Forge Co., Canton, O.

The receivers' report shows that the company is no longer operating at a loss, business now amounting to in the neighborhood of \$1,000,000 a month.

### A DELUXE ACHIEVEMENT.

Some seven or eight years ago Edward W. Clark, an engineer and inventor of 30 years' experience, decided to give a portion of his time to research work in connection with internal combustion motors, particularly automobile motors. Being thoroughly practical, Mr. Clark quickly decided that to make the motor efficient something must be done to reduce the weight of the reciprocating parts.

After about two years of experimenting he produced what was up to that time stated to be the most nearly perfect piston, consisting of an aluminum head and cast iron skirt, united in an unique and original manner, very light in weight and wonderfully successful and on which basic patents were granted. But its inventor felt that it could still be improved.

For instance: There was considerable wear on the ring grooves cut in the aluminum head. Mr. Clark overcame this by inventing a piston having a steel head with cast iron skirt, obtaining patents on this piston also.

In the several years that followed Mr. Clark continued to devote much time and attention to the further development of his piston. Many radical changes were made and finally came the beginning of the braced or ribbed piston. Mr. Clark at once stopped the manufacture of other kinds and devoted his attention to the further development of his latest design, until the organization of the Clark-Turner Piston Co., Aug. 1, 1919, when the ribbed or reinforced piston was placed on the market nationally. Since then there has been constant improvement and today every detail—every step in production, from the daily analysis, through the electric furnace, through plant down to final inspection and shipment is carefully guarded, checked and rechecked.

Deluxe pistons are now made in standard and oversize for more than 800 makes of automobile, truck, tractor, motor boat, motorcycle and airplane engines.

Deluxe pistons are not an experiment—they are scientifically designed, light weight gray iron pistons, proved through actual use.

### ALCO DELUX BATTERY.

Realizing the necessity and appreciating the demand for a Ford battery to retail at \$25, the Cincinnati Storage Battery Co., maker of the well known Cincinnati storage batteries, are now putting on the market a battery which is called the Alco Delux.

The Alco Delux is a six-volt, full strength battery for Ford cars and may be used for Buick, Chevrolet, Overland and other cars as well. It is especially adapted for wireless outfits and for various other purposes where a small battery is required.



various other purposes where a small battery is required.

This battery embodies the same principles which have made other Cincinnati storage batteries so popular with distributors, dealers and car owners. A feature of the Alco Delux is the remarkable insulation qualities of the wood separators, which are manufactured by a special process. It is a well known fact that the life and usefulness of a storage battery is dependent on its insulation. The manufacturer is ready to attest by actual comparative figures the unusual life of the separators used in the Alco.

The advent of this special battery will be good news to all dealers who have done so much to promote the sale of Cincinnati storage batteries, as it will allow them to complete the Cincinnati line and to be prepared to meet all classes of battery trade.

Full information regarding the Alco Delux battery, prices, shipping dates and allotment of desirable territory still open may be had by writing or wiring the Cincinnati Storage Battery Co., Moorman avenue, Cincinnati, O.

# A Railway for Ideas

**T**WO business concerns with the same physical equipment and opportunities may enter the field at the same time. Yet, within a year, one may forge far ahead of its competitor. You have seen it happen many times. Why? Because one had *better ideas*.

Business failures are nearly all failures of ideas. The ability to acquire and use the right ideas is the measure of success or failure.

For every idea you originate, thousands are originated by others. For every idea you *believe* may work, thousands are tested in the laboratory of experience.

## LIST OF MEMBERS

*Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.*

Advertising and Selling  
American Architect  
American Blacksmith  
American Exporter  
American Funeral Director  
American Hatter  
American Machinist  
American Paint Journal  
American Paint and Oil Dealer  
American Printer  
American School Board Journal  
Architectural Record  
Automobile Dealer and Repairer  
Automobile Journal  
Automotive Industries

Bakers Weekly  
Boiler Maker  
Boot and Shoe Recorder  
Brick and Clay Record  
Buildings and Building Management  
Building Supply News  
Bulletin of Pharmacy

Canadian Grocer  
Canadian Railway & Marine World  
Candy and Ice Cream  
Chemical & Metallurgical Engineering  
Clothing and Furnisher  
Coal Age  
Coal Trade Journal  
Concrete  
Cotton

Daily Metal Trade  
Distribution and Warehousing  
Domestic Engineering  
Dry Goods Economist  
Dry Goodsman  
Dry Goods Reporter

Electric Railway Journal  
Electrical Merchandising  
Electrical Record  
Electrical World  
Embalmers' Monthly  
Engineering and Contracting  
Engineering and Mining Journal  
Engineering News-Record

Factory  
Farm Implement News  
Farm Machinery—Farm Power  
Fire and Water Engineering  
Foundry (The)  
Furniture Journal  
Furniture Manufacturer and Artisan  
Furniture Merchants' Trade Journal

Gas Age  
Gas Record  
Grand Rapids Furniture Record  
Haberdasher  
Hardware Age

An idea developed in New York is of no use to a Californian unless he hears about it. That is why there must be "railways" for ideas, channels for the exchange of constructive thought.

Business Papers are the "IDEA RAILWAYS" which bring you the best ideas in the world interpreted in terms of your particular kind of business. They are hardly less important than the railways of iron and steel. Without "Idea Railways" to effect a "meeting of minds" no sales could take place, no goods could be shipped.

## A Shipment for You

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### CRACKED WATER JACKET.

(N. E. W. Brookline, Mass.)

The engine of my Cole car has two cracks in the water jacket through which the water seeps. I have heard that there are several compounds on the market that will seal small leaks of this nature if applied in time. Kindly tell me through the columns of the Automobile Journal where these may be obtained.

There are several well known compounds on the market for this purpose and they may usually be obtained from the accessory dealer or garage repairer. If not you can easily send to the manufacturer and he will gladly fill your order.

The E. C. Harner Manufacturing Co., Benton Harbor, Mich., manufactures Alumiflux, a repair for all metals that can be heated either in the car or out, while F. A. Albertus & Co., Milwaukee, Wis., manufactures welding compounds and soldering compounds which are claimed to be a perfect substitute for acetylene welding.

### PROPER SETTING FOR CONNECTICUT INTERRUPTER.

(A Subscriber, St. Louis, Mo.)

I have a four-cylinder car equipped with Connecticut ignition, open circuit system. The distance between the points of the breaker is from .015 to .025 inch. Why this changeable distance and what effect has this on the engine? If I change the distance between the points will it give any advantage in hill climbing, or slowing down in traffic? Why does the point on the distributor arm burn off where contact is made between the points of the distributor cover?

In the first place the Connecticut interrupter is not of the open type as you state, but of the closed type, the points being separated by a cam fixed upon a center shaft and operated by the engine usually driven from the pump shaft at lobes as there are cylinders of the engine, and they strike one-half engine speed. The cam is provided with as many against a roller of the interrupter arm, thus separating the points. The adjustment which you mention is too great for the Connecticut system and should be changed to .016 inch

for a four or six-cylinder engine, while still others recommend an adjustment as close as .010 inch. You will probably find that this setting will allow you to take hills at good speed without skipping and also to run slowly in traffic.

Burning of the point of the distributor arm is caused by an arc formed between the point and the point of contact. In earlier types of Connecticut distributors this was taken care of by a carbon brush, which bore against the side of the cover making contact. Later types, however, use a metal strip on the end of the distributor arm, allowing a small gap between the points through which the high-tension spark jumps to the terminal wire contact leading to the plugs. Possibly this arm may not be positioned correctly on the shaft or wear is present, allowing it to run irregularly. Fitting a new arm may overcome the burning of the point. If the engine is timed correctly this should not occur so as to be noticeable.

### FORD VALVE SETTING.

(P. A. P., Detroit, Mich.)

I have just installed a new set of oversize valves and push rods in my Ford engine, the push rods being threaded and fitted with adjustable nuts. I have set these valves according to the instructions given in the Ford Manual and they are exact, so that a movement of the piston 1/64 inch will free the valve from its seat. After the valves were set I measured the clearance between valve stem and push rod with a thickness gauge and found that there is .025 to .028-inch clearance on all valves. This large amount of clearance creates a great amount of noise that I want to get rid of, although the engine has lots of power and "pep." After a week or so I adjusted the clearance, on all valves, to .004 when hot and find that the noise is gone and also a large amount of power, on account of earlier opening and later closing. In this condition, at high speed, the power is fairly good, but from six to 15 miles an hour there is a popping effect in the carburetor, due apparently to the exhaust and inlet opening at the same time at the end of the exhaust stroke. Kindly give me the names of manufacturers that design a camshaft to take up this clearance and not disturb the valve timing, so that I may get a quieter valve action and not lose power.

Your method of setting the valves was apparently correct, as this is the method advocated by the Ford Motor Co. and is practised by all Ford repairers. An article was written in the December, 1919, Automobile Journal, page 55, which covered this matter very fully, giving the points of setting and explaining the matter in detail.

The setting which you first obtained was apparently the best that could be expected, as your engine is probably more

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or less worn, making it impossible to get a setting such as might be expected in a new engine. To get the utmost power with any engine there is bound to be some noise present in the valve mechanism. When this is adjusted too close, loss of power will invariably result, as you found when you changed the setting on all valves to .004 of an inch. You will doubtless get better results with your engine by setting the inlets to .006 and the exhaust to .010 of an inch. This setting allows more clearance at the exhaust adjustment on account of the greater amount of heat given off by the exhaust gases as they pass over the top of the exhaust valves, and the setting of the inlets may be closer by about 60 per cent., as they operate under cooler conditions. If this setting proves too close, vary it in the same proportion, making the exhaust setting either .012 or .014 of an inch and the inlet about .008 of an inch. By testing the clearance with a gauge you will be able to set the valves to the desired closeness and can still use the Ford camshaft.

We do not think it will be necessary for you to go to the expense of installing a high-speed camshaft, as these are mostly used in racing cars where the engine is fitted with a special carburetor and the car with special gears in the differential.

A list of makers of high-speed camshafts is given: Laurel Motors Corporation, Anderson, Ind.; McCadden Machine Works, Inc., 316 Sixth avenue, North, St. Cloud, Minn.; D. R. Noonan, 220 West Washington street, Paris, Ill.; United States Metal Goods Co., 5211 Euclid avenue, Cleveland, O.

#### ENGINE TIMING.

(E. J. G., Boston, Mass.)

When timing a four-cylinder engine, No. 1 cylinder being just over dead center, should the magneto points be fully open? Should the firing order be 1, 3, 2, 4? What should be the position of the valves? What is the timing of a six-cylinder and a 12-cylinder? What is the timing of a two-cylinder and the correct position of the valves?

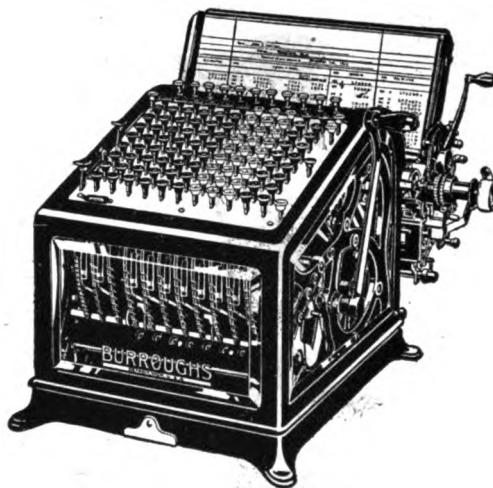
Your query is so indefinite that no practical answer can be given. When any engine is timed the ignition spark must be created after the charge has been compressed. This point may range from 30 degrees before top center with racing engines to as much as 10 degrees past top center (in which event the spark is fully retarded). The average travel of the spark lever is about 35 degrees.

There is no fixed rule for engine timing, for this differs in different engines. Usually the flywheels are marked to facilitate the work, the marks indicating the top dead center for the first and possibly other cylinders, and the marking may be "D C 1-4" or "1-4 up," and with such indication the pistons of the two cylinders are at dead top center. There may be other marks which show when the valves of No. 1 cylinder open and close. The inlet valve is designated by "I" or "IN," followed by "O" or "C," and the exhaust valve by "EX-O," "E-O" or "X-O." Usually there is a straight line across the rim of the flywheel that should register "center" on a mark or pointer on the cylinder block.

If the marks simply show which pair of cylinders are at top dead center the worker must note the valve operation. If the common practise is to time from the first or No. 1 cylinder, the flywheel markings will always apply to this cylinder, and when this cylinder has been timed all the others will be timed. Without flywheel marks timing is by valve position. The exhaust valve should be completely closed at top center and possibly before it, and the inlet valve will open directly after the exhaust valve has closed. The ignition point is one complete revolution of the flywheel from this point and, with the engine idling or running slowly, possibly still later, with the engine driven fast before top center.

The spark is created by the separation of the platinum points of the circuit breaker and, for this reason, the magneto points, so-called, are closed, but this opening will be advanced or retarded by the movement of the breaker box housing or the arm on the breaker box camshaft. The spark is made just as the points begin separation.

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The timing or firing order of any four-cylinder engine may be either 1, 3, 4, 2, or 1, 2, 4, 3. No other combination is possible.

What has been stated with reference to timing a four-cylinder engine will apply to all other types. If there are not flywheel marks, the right cylinder of a two-cylinder engine, the No. 1 cylinder of the right bank of an eight or 12-cylinder, V-type engine, or the No. 1 cylinder of any tandem engine is accepted as No. 1 for timing. There are exceptions, of course, to beginning with the right bank No. 1, for several makes are timed from the left bank.

The firing of practically all six-cylinder engines is 1-5-3-6-4-2, or 1-2-4-6-3-5. The firing of eight-cylinder engines is begun on the left bank with a number of makes and the left bank fires 1-3-4-2 and the right bank 2-1-3-4 in this order: 1L-2R-3L-1R-4L-3R-2L-4R. Some of the 12-cylinder engines fire in the same order as the six-cylinder, beginning with the left bank, 1-4-2-6-3-5, and the order for the 12 cylinders is 1L-3R-4L-5R-2L-1R-6L-4R-3L-2R-5L-6R; but other makes fire 1-5-3-6-4-2, and the order for the 12 cylinders is: 1L-2R-5L-4R-3L-1R-6L-5R-2L-3R-4L-6R.

The object of the question relative to the position of the valves is not clear and would require a lengthy explanation to show the opening and closing of each valve with reference to any assumed position of the engine, as when timed from No. 1 cylinder.

### STORAGE BATTERIES.

(L. S., Rochester, N. Y.)

Kindly answer the following questions through the query columns of the Automobile Journal:

1. What is the separation distance between the plates of a storage battery cell?
2. Why is an expansion joint used in the wooden battery box?
3. What is a vibrating rectifier and how is it constructed and used when charging batteries with alternating current?
4. How are the plates connected in each cell and how are two or more cells connected for the complete battery?

1. The plates of the positive group are separated from each other by about half an inch, so that when the plates of the negative group are placed between them sufficient space will be left for the insertion of wooden or rubber separators or, in the Willard battery, for the insertion of threaded rubber separators.

2. An expansion joint is used in constructing the wooden box container for the battery cells because of the moisture which is present, and because the battery is usually in position in the car so as to be exposed to outside moisture.

3. A vibrating rectifier is a form of current converter, utilizing a permanent magnet and an electro-magnet. It is a well known fact that opposite magnetic poles (north and south), tend to draw together, while there is a repulsion between like poles. In the vibrating rectifier, the electro-magnet is mounted in such a manner that its poles are between or adjacent to those of the permanent magnet. Because the coils of the electro-magnet are energized from an alternating current, its poles change from north to south in synchronism with the alterations. As the polarity of the permanent magnet remains fixed there is a tendency to alternate repulsion and attraction, in tune with the current frequency, between the two magnets. By making the electro-magnet small and hinging it with springs, as in the armature of a door bell, it becomes possible for the magnet to vibrate, in tune with the alternating current. By providing it with a contact maker, one pulsation of the alternating current is stopped, making a form of pulsating direct current suitable for charging batteries. Voltage regulation is obtained by the usual transformer. Large machines have two units, operating in parallel. Claim is made for this apparatus that the first cost and upkeep of the machine is low and that it proves very efficient in operation. Renewal of the contact-making surfaces is occasionally needed. For charging one or more starting and lighting batteries for home or small garage use this device is claimed to be very efficient.

4. The positive group consists of one or more positive plates burned to a connecting strap, and the negative group of two or more negative plates connected to a similar connecting strap. To each strap is attached a post, which is used to make electrical connection between two adjoining groups or to the starting and lighting system.

An element consists of a positive and a negative group, together with the separators. The negative group always has one more plate than the positive group; for example, a three-plate element would have one positive and two negative plates and a five-plate element would have two positive and three negative plates. This is true regardless of the number of plates in the element.

The plates are burned to the connecting straps usually by a hydrogen or oxy-acetylene flame, so that the plates and strap form one unit. The plates are so arranged that when the element is assembled each positive plate surface is adjacent to a negative plate surface, the distance between these surfaces being from  $3/32$  to  $1/8$  inch. The positive and negative surfaces are kept apart by insulators known as separators.

Each cell, after being properly charged, gives approximately two volts with a current capacity corresponding to the size of the plates and the total number of square inches of free active material in them. Consequently, when several cells are connected in series, that is, the terminals connected positive to negative, the same as in connecting dry cells for ignition, the total voltage across the battery terminals will be the added voltage of all the cells, while the current capacity will be the same as the current from one cell. For example, across a three-cell battery the voltage is six volts and across a six-cell battery the voltage is 12 volts. It is sometimes found that the voltage will vary slightly from these figures, depending upon the condition of the battery, the charging rate and the temperature when charging.

#### HOW TO DESCEND STEEP GRADES WITH SAFETY.

(H. W., Chickasaw, Pa.)

1. Kindly tell me through the query column of the Automobile Journal the correct method for descending long or steep grades with safety, and without undue wear of the brake shoes, and how to use the engine as a brake in hilly sections.

2. How does the third brush regulate a generator? Does the third brush decrease the current as the speed of the generator increases? Kindly explain its operation and how the charging current is controlled.

3. Is it possible to operate a Ford engine without vibrators or a make and break in the primary circuit? Could a coil be made that would do this and if so what size should it be and what winding should be used?

1. Motorists in general have found that the better practice when descending long or steep grades is first to use their best judgment as to how to make the descent. Some motorists, who are new to hill work, depend wholly on the service and emergency brakes for the descent, which wear the brake linings excessively. More experienced drivers combine the braking effect given by operating the engine in connection with the speeds of the transmission for making the descent, figuring to save the brake linings.

Many motorists deem it the better policy to throw off the ignition, closing the throttle and retarding the spark levers, allowing the engine to act as a brake alone against the momentum of the car without the use of the service or emergency brake, using one of these, usually the service brake, simply to check the speed if the engine is not sufficient.

On very steep grades, or where the road is very slippery, the second or the first speed may be used to good advantage with the braking action of the engine to take the car down with safety and, in very rare instances, the use of the reverse gear is to be recommended. To use the reverse gear the car should be brought to a complete stop at the top of the grade if the driver's judgment tells him that he will have to use this gear, and the gears should be shifted before the car starts down. The reverse is used in connection with the clutch, throwing the clutch out to allow the car to coast, and



The golf links of the Greenwich Country Club, Greenwich, Conn., photographed at an altitude of 1,500 feet.

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dropping the clutch in, to check the momentum. For average hill work the service and emergency brakes will usually prove sufficient, but in extreme instances the engine may be used as described. The engine will not suffer damage if this procedure is followed but, if the ignition is left on, with the spark fully advanced, the engine will continue to operate with irregular action, especially if the throttle is retarded, and in this case damage may occur to the engine crankshaft, although this is a remote possibility.

2. The third brush, with which many charging generators are fitted, is used solely to increase or decrease the charging rate of the current which goes to the storage battery. When a car is driven during the day and very little or none at all at night, the battery is liable to become overcharged, and the third brush may be changed so that the charging rate may be decreased, preventing the battery from becoming overcharged and possibly damaged. If, on the other hand, the car is driven more at night than during the day, with the lamps lighted, more current will be taken from the storage battery, with the result that the battery will soon be undercharged or weak. Increasing the charging rate by means of the third brush will remedy the trouble and keep the battery in a charged condition.

The third brush is usually set at the factory for the correct rate of charging for the varying conditions under which a car is liable to be used, and very seldom requires changing. If the brush is changed, however, care must be taken to properly seat the brush in the new position, using a strip of fine sandpaper between the brush and commutator, with the sand side next to the brush, rotating the generator shaft, till the brush seats perfectly. If this is not done the brush will not deliver its full output and arcing is liable to occur between the point of contact of the brush and commutator.

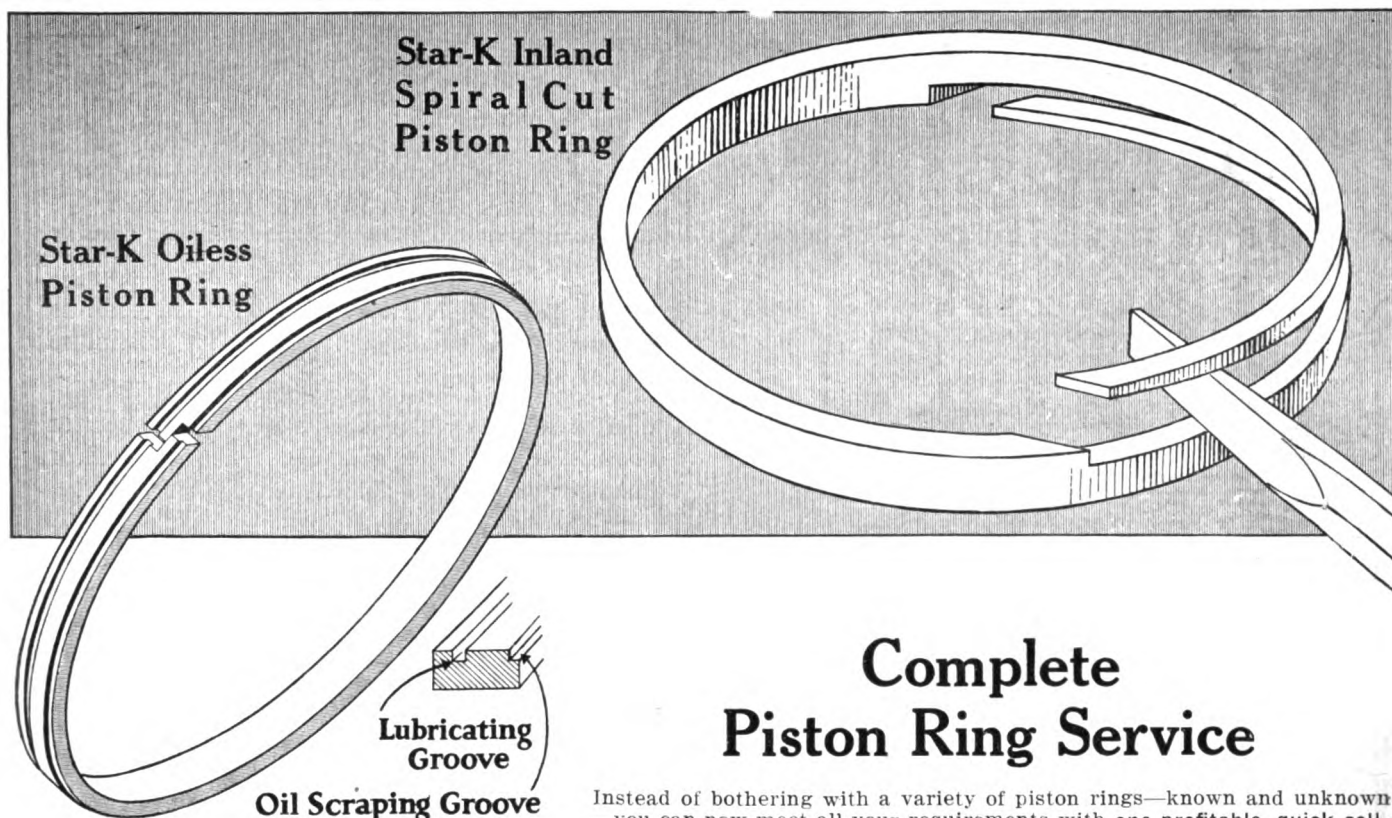
The fact that the charging rate decreases as the speed of the generator increases, is due to the automatic charging regulator or cut-out switch, which is placed in the charging circuit to prevent overcharging of the battery. The automatic regulator usually operates between 15 and 25 miles an hour of the speed of the car. In other words, at 15 miles an hour the regulator closes the charging circuit, allowing the predetermined charging amperage of the generator to enter the battery and recharge it; this charging rate usually remains constant till a speed of 25 miles an hour has been reached, when the regulator gradually opens the circuit, allowing less and less amperage to flow to the battery, till at 30 miles an hour the charging circuit is disconnected and no more current or very little flows through to the battery. This is done to protect the battery and prevent overcharging and will explain why your charging rate goes down as the speed increases.

3. The Ford Motor Co. does not recommend that any method of ignition be used with the Ford engine other than that which is supplied with the car. However, many Fords are equipped by their owners with high-tension magnetos, which do not require a coil or vibrator for their operation. The Ford magneto in the later cars is an 18-volt machine, the voltage varying from 18, which is the highest, down to 12 or 15 volts, according to the speed of the engine. The magneto is an alternating current type, and to use it successfully four coils fitted with vibrators are necessary, while the breaker cam, operating on the front end of the camshaft, is also necessary in the primary circuit to mechanically determine the flow of current to the coils, the coils taking the place of a distributor and distributing the high-tension current to the plugs. You may use a master vibrating coil, which may be purchased at any supply house, which will cut out the four coils, and use the single master coil for ignition.

A breaker and distributor are used in all high-tension magnetos. This type of magneto would simply eliminate the coils and vibrators, and would probably prove very satisfactory on a Ford engine, as special fittings can be purchased from supply houses, which makes the installation quite simple. However, you will lose the use of the regular Ford magneto by so doing, except for lighting and horn purposes.

Other types of ignition are not suited to Ford ignition, because of the special fittings required, which at present are not in the market, and the system used by Ford seems to give good service.





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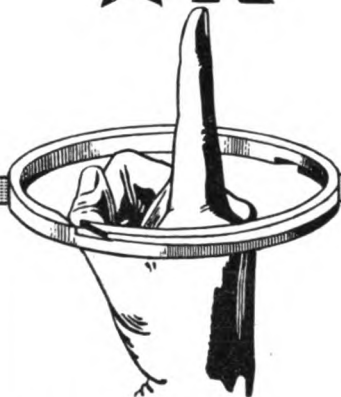
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**AUTOMOBILE  
JOURNAL**  
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**A Tractor Journal  
devoted to the  
tractor industry and trade**

Published by  
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# AUTOMOBILE JOURNAL

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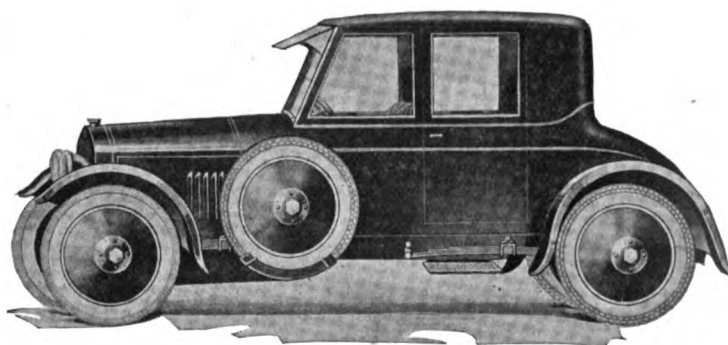
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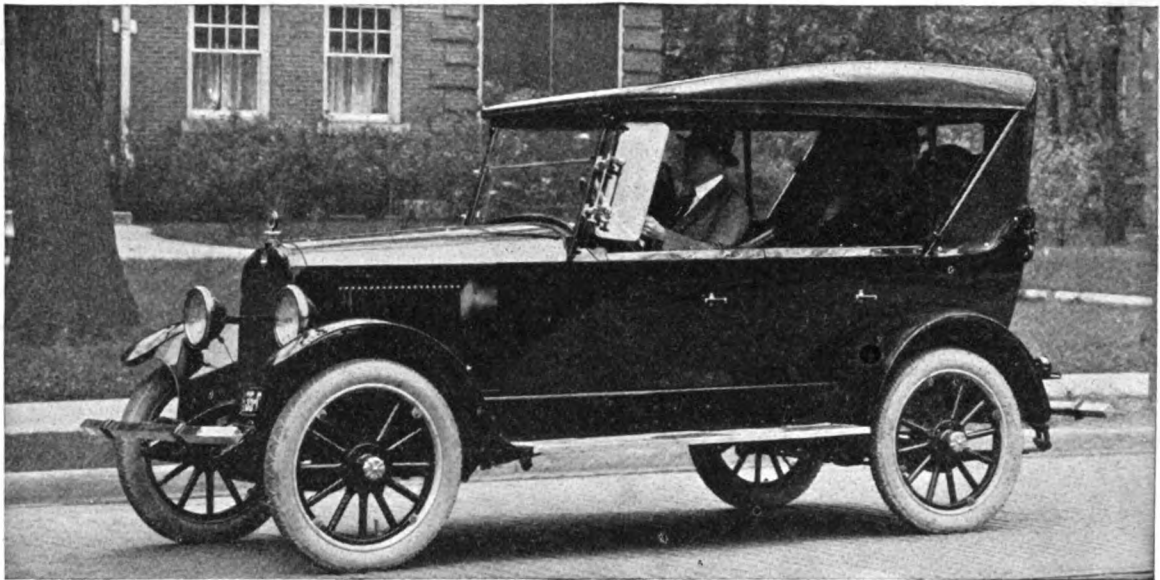
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Even you who know the Briscoe well will, I believe, be delighted with the results achieved during the last few weeks. Today there is no question that the Briscoe stands alone in style and distinctiveness. The Briscoe dealer finds ready sales simply because the car has been lifted out of the ruck of competition; there is no other car of its type with which comparison is possible.

# BRISCOE

Clarence A. **EARL**, *President*

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*Clarence A. Earl* *President*

**BRISCOE MOTOR CORPORATION, JACKSON, MICH.**

The Canadian Briscoe Motor Company, Limited, Brockville, Ontario

(271)



# THE AUTOMOBILE JOURNAL

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NO. 11.

## Rolls-Royce Now "Made in America"

*Branch Factory of Derby, England, Plant Under Supervision of British Engineers and Mechanics—Famous Cars Are Built Identical with English Model—Production in United States Saves \$2000 Import Tax on Chassis*

(By S. G. SWIFT.)

THERE is only one Rolls-Royce. Whether manufactured in Derby, England, or Springfield, Mass., the car is identical in performance and appearance. The mechanical expert admits it and the metallurgist proves it. So truly is the product of one factory a twin with the other that the engineer cannot detect the slightest detail of physical difference and the chemical analysis of the materials entering into the construction of the English and the American product also fails to show dissimilarity.

And if this were not so the management of Rolls-Royce would feel that it had sadly failed to accomplish its purpose, which was to manufacture the Rolls-Royce automobile in America—and there can be but one Rolls-Royce.

Built to the standard of an ideal, rather than as a commercial proposition, the Rolls-Royce car has closely courted perfection for 17 years in England, and today, as made in Springfield,

represents the mature effort of more than a decade of cumulative endeavor on the part of F. Henry Royce and his associates.

Mr. Royce, the genius to whom the Rolls-Royce automobile owes its development, is one of the best known automotive engineers in the world. Formerly regarded as an electrical engineer of unusual ability, he found his true sphere in the designing and perfecting of the internal combustion engine, and has to his credit, besides the Rolls-Royce automobile, the engines which equipped the first aeroplane to fly across the Atlantic, June 14, 1919, and the first one to cover the long distance between England and Australia, which flight was performed under great difficulties in the latter part of the same year.

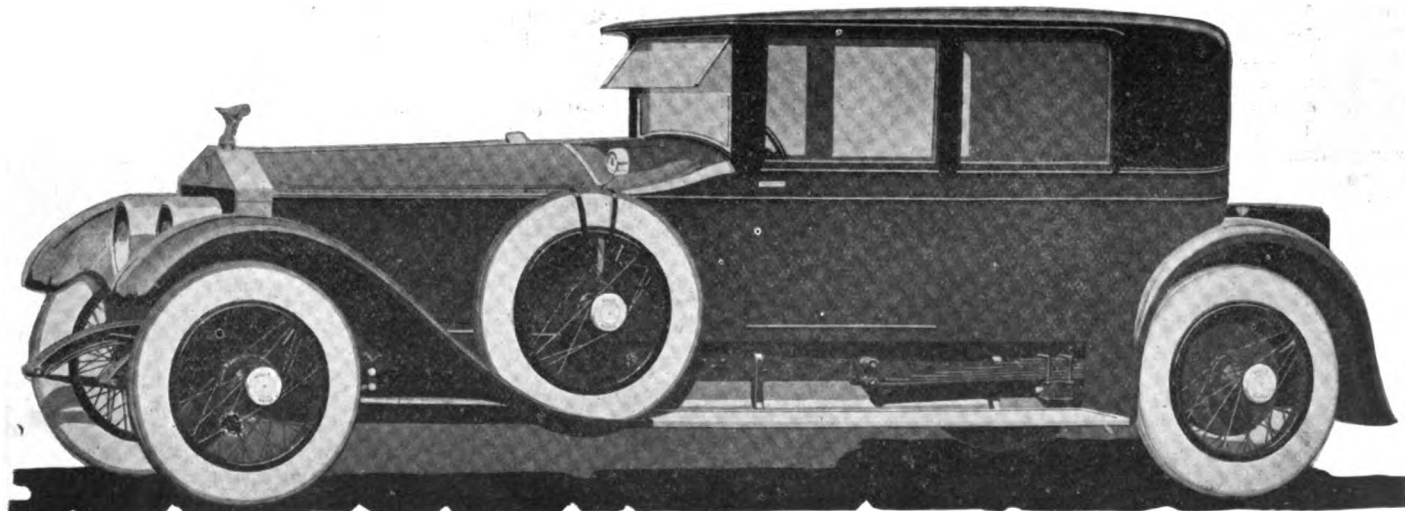
In speaking of the present method of building his cars in England and America, Mr. Royce said:

"There will be no difference in quality

of production; no 'English' or 'American' make—only just the one Rolls-Royce. As fine as it has ever been or finer. The car produced in America will be built under the supervision of English forces exclusively, and will be supplied to English and Canadian as well as American patrons. During the war perfect parts for Rolls-Royce cars were made in America and shipped to England for British production. Therefore, what we are doing in America is nothing untried."

Mr. Royce is a member of the British Institute of Mechanical Engineers, member of the British Institute of Electrical Engineers, and besides being the designer of the Rolls-Royce automobile and aeroplane engines, is engineer-in-chief of the Rolls-Royce organization in England and also in America.

The active head of the organization in America is L. F. Belnap, president of the Rolls-Royce of America, Inc. He was attached to the British war mission during



The Rolls-Royce Is Truly an Aristocrat of the Automobile Family. This Beautiful Car, Now Manufactured at Springfield, Mass., Represents the Cumulative Result of Years of Study and Research on the Part of F. Henry Royce and His Associates. The Model Shown Is an Enclosed Drive Which Is Very Popular as an All-Season Type.

the war and became intimately associated in the manufacture, in America, of units for the Rolls-Royce aero engines, which industry was established at the request of the British government to supplement the production of the English works. He also has had long experience in the automotive industry and through association adds much to the already good repute of Rolls-Royce of America, Inc., concerning the product of which he says:

"The American production, including procurement of materials, is under complete English Rolls-Royce supervision. The Rolls-Royce cars made in the American works will be identical and interchangeable with those made in England in the most minute detail. As a matter of fact we will continue to import cars from the English works, which will be indiscriminately mixed with the production from the American works and no one, not even our own organization, will

from the original venture to all world capitals, so does Rolls-Royce naturally and inevitably extend its activities across the Atlantic."

#### Mechanical Excellence of Rolls-Royce is Traditional.

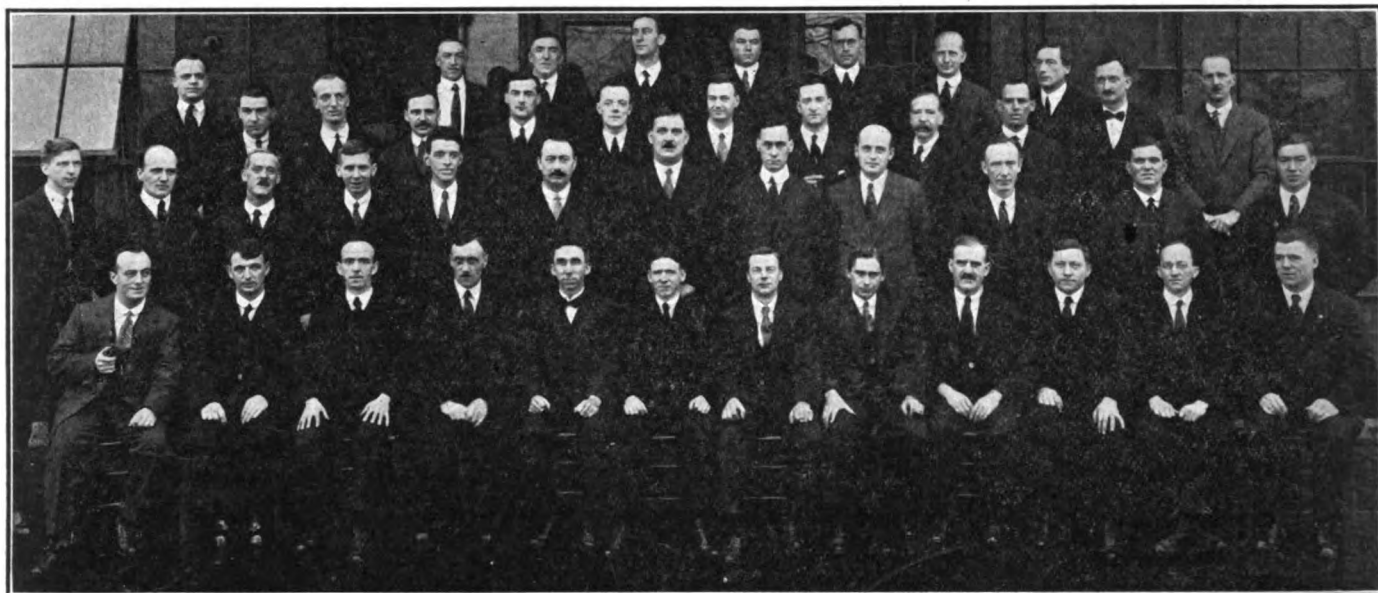
The innate high qualities of construction, design and general mechanical excellence of this car have long been traditional. Though manufactured in England, it has been widely distributed in the United States, where it has always held the sustained attention of all who were interested in the automotive industry and now, by reason of being manufactured in this country, takes on added interest as one of America's truly fine cars.

The Rolls-Royce distinctly emphasizes the English characteristic of pricing a product after it has been built, rather than before, and the chassis, as a result, is one of the highest priced in the world. This method of manufacturing and mer-

cellence. Rather, it is the result of cumulative faultless design and construction. This automobile so represents the epitome of general mechanical coordination that it is hard to settle on one thing which, more than another, contributes to its perfection. It has a minimum number of parts, all arranged in a most convenient and accessible manner; it is light, but strong, and has a world of speed and comfort. It is economical to operate, and gives the maximum tire mileage, but perhaps the most striking feature from the viewpoint of the layman is the quietness of its operation.

#### Quietness Result of Design and Construction.

The quietness of the Rolls-Royce has been one of its greatest selling assets. From year to year new ways of accomplishing this very desirable feature have been discovered by exploring engineers, until today the present motor is as near silent in operation as it is possible for an



Rolls-Royce Production in America Is Well Taken Care of by This Group of Experts, Who Came to the United States from Derby, England, Works to Supervise Manufacture of the Car. Picture Was Taken at the Celebration Commemorating Completion of First Chassis at Springfield.

determine any difference in the product of the two works."

Claude Goodman Johnson, managing director of Rolls-Royce, Ltd., and chairman of the board of directors of the organization in America, is a man of wide experience in the automotive industry. He was a leading figure in the development of the motor car in England and was prominently identified with the planning and management of early motor car trials. He is an unusually gifted business man and as an organizer is unexcelled by few, having an unerring faculty for the selection of the right measures and the right men. Mr. Johnson, in a few concise words regarding the American project says:

"We have come to America to build a limited number of genuine Rolls-Royce cars. This we are doing partly because the Derby works are sold up over two years ahead, and partly because by so doing the high quality of Rolls-Royce service can be maintained and increased.

"Just as the Ritz-Carlton hotels, through their excellence, have spread

chandising has its good features from the standpoint of the purchaser who, by reason of the long wearing qualities and the comparatively small upkeep attached to such a purchase, has seen ample demonstration of the actual economy of buying at a high first cost.

Such purchasers realize that every high priced automobile made in America is an investment that pays big dividends in long service, ably testifying to the adage that "Low price is not (necessarily) low cost." As ocular proof that this is true, the writer has examined a Rolls-Royce car that was brought to this country in 1910. With the exception of a few minor refinements, it is identical with the machines turned out today, and looks good for many years of service after a few simple adjustments. Its enthusiastic owner claims that it has cost him no more money than he would have spent on low priced cars during the time he has owned it, and one is inclined to believe him.

Rolls-Royce high quality is accounted for by no one outstanding feature of ex-

ternal combustion engine to be. Even with the hood lifted and the engine running at a fair speed there is no sound apparent and if it were not that one sees the fan and the water pump moving, it would be hard to believe that the engine was turning over.

There is a slight humming noise which is occasioned by the fan blades, but aside from this there is no more sound than would be made by an electrically operated plant. The average person probably does not stop to think that the quieter an automobile engine runs the easier it is for even the smallest rattle to be detected.

This means that extreme quietness can only be accomplished by cumulative effort and painstaking attention to minor details, rather than through the wholesale application of one basic principle to the power plant and driving mechanism. Rolls-Royce engineers realize the truth of this, and for years have experimented with every moving part of the car in their campaign against noise and chatter.

The detailed result of their experi-

ments as seen in the silent motor will be of interest to the reader and is briefly outlined by the writer in a manner that will be easily understood by such as are not technically educated.

#### All Moving Parts Run Separately Before Final Assembly.

Oil pumps, gear boxes, axles and timing gears, the greatest sources of noise and chatter, are all assembled separately and are run under power until lapped in. All rotating parts are balanced, including the crank shaft, and even the wheels and tires are balanced. All bearings, of superior design and finish, go through a series of tests before and after assembling, including a quietness test. The flywheel is finished and machined after being bolted to the shaft and being thus trued must run exactly even.

Another factor that does much to eliminate chatter is the special cam grinding machine which, invented by Rolls-Royce engineers, gives a true cam dimension, and does work that is practically perfect. Cam grinding has always been a source of trouble to automotive manufacturers, many of whom have come to using special machines for this very important work.

Piston slap, another source of noise, is done away with in the Rolls-Royce engine by the simple expedient of splitting the skirt of the piston. This allows for the extremes of expansion and contraction, and also furnishes a means of making the cylinders tight after the car has run for some time. This being done by simply spreading the skirt the fraction of an inch.

One source of chatter which comparatively few automobile manufacturers have succeeded in eliminating is caused by loose bushings. This is done away with in Rolls-Royce design by making the bushings with shoulders, so they cannot turn and work loose. There is no chance of chatter from loose brake rods, as these can be easily adjusted by the driver without moving from his seat by means of a large hand wheel, the adjustment being self locking.

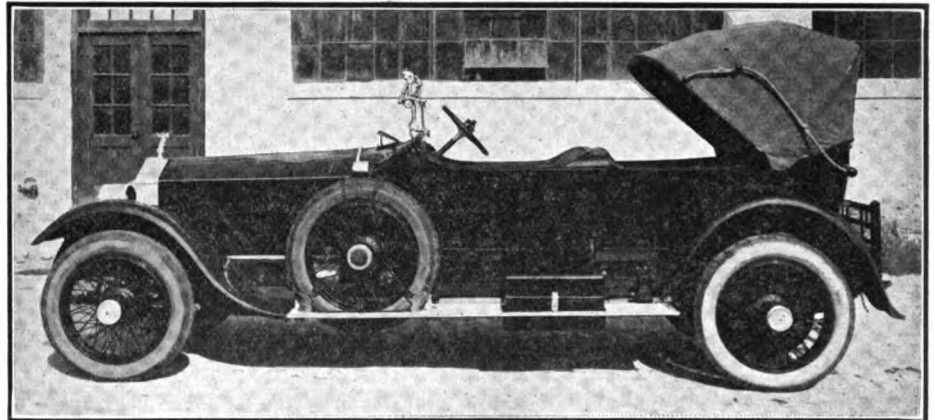
The absence of bent levers is indicative of the care in design for, as is known, a lever which is bent is placed in torsion, eventually causing a chatter through wear of the bearing surface, due to what might well be called side thrust.

All bearing surfaces in the Rolls-Royce

are not only exceptionally large, but nowhere throughout the whole car is there any side thrust, every moving part centering perfectly, and seating exactly throughout its entire bearing surface.

tion of Rolls-Royce get down to practical experiment, and by methods of elimination and induction decide the actual size and weight of each part.

These experiments are carried out on



Refinement, Comfort and Dignity Combine with Graceful Lines to Make This Rolls-Royce Victoria Top Touring Car Distinctive and Unusual.

The transmission case is all made in one piece and a very large center bearing is provided which enables the gears to keep their alignment and run quietly, and insures reliability that will continue for the life of the machine. And the same painstaking care that is so apparent in silencing the different units of Rolls-Royce construction is followed by a final testing and grooming of the chassis before delivery to the customer. One of the most important laws of Rolls-Royce policy is that the finished chassis must run silently, and continue to so function.

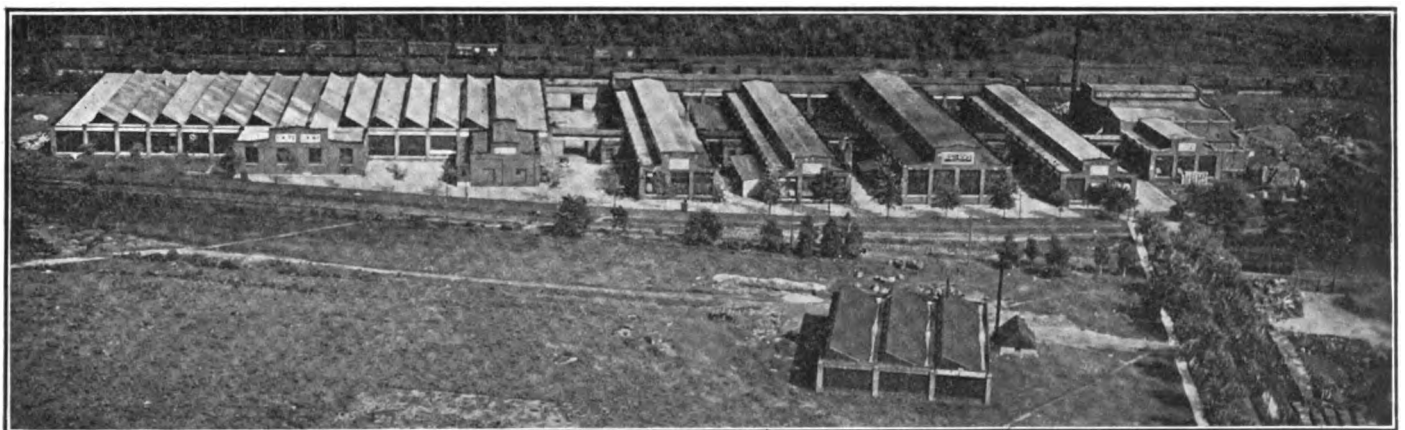
#### Proportion and Finish Rolls-Royce Characteristics.

Perhaps the first thing that the layman notices about the Rolls-Royce chassis is the smoothness of its lines. One gets the feeling that every part is of just the proper size to do efficient work and there seems to be an absence of superfluous weight. The wheels are wide and strong, the side frames and cross member are unusually rugged, and there is a look of exact proportion about the whole chassis which incidentally is finished off as carefully as though it were to be exhibited at a show.

This exact proportion has been developed as the result of exhaustive experiment. Disregarding theoretical tests the engineers responsible for the perfec-

a destruction machine which consists of four five-foot drums with cams or bulges on the circumference of each, which are let into the floor, covering the same track as does the car itself. These drums are placed with the cams at different degrees of balance. Thus when they are revolved the cams or bulges will not be opposite each other, but will be at least 45 degrees out of line. The car to be tested is placed in position over the drums and fastened, and the drums are started revolving at the rate of 150 revolutions a minute. The effect of this is similar to what the car would experience in running over an unusually bad road at a high degree. One side of the chassis is in the air while the other is down and the whole mechanism is subjected to a severe binding and torsional stresses which actually seek to destroy the different parts of the car.

When during the test a part of the car breaks the contrivance is stopped and a substitute piece a trifle larger than the one which has broken is put into place, and the drums are again started revolving. This practice is kept up until all units stand the shock without breaking. Following this, all original units that have stood the strain successfully without breaking are replaced with others of lighter construction, which are decreased



Aviator's View of New Rolls-Royce Plant at Springfield, Mass. This Group of Buildings Is Exceptionally Well Planned and Equipped. The Chassis Made at This Factory Are Identical with Those Made in England and Even the Expert Can Detect No Difference Between Them.



A Few of the Many Turret Lathes Used in the Manufacture of Parts for Rolls-Royce Cars.

in size until they also break, after which they are replaced by members the least bit stronger than were those that broke.

This process of testing, expensive and painstaking, means just one thing—that each part of a Rolls-Royce car is exactly as strong as it should be, that sizes of the different parts are correct, and the whole machine is of proper weight to adequately do the work for which it was intended. This elimination test, which even now is kept up from time to time, is as thorough as anything that might be devised.

The Rolls-Royce stock chassis, without body, selling at \$11,750, is guaranteed for three years against faulty workmanship and parts, and when one stops to think of the many different operations necessary to bring the chassis up to the Rolls-Royce standard of excellence, the amount of time and thought which has gone into the construction of it, and the general high-grade character of the machine, the price seems not exorbitant, the more so when one realizes that approximately \$2000 of import tariff is saved to the purchaser through the building of the machines in this country.

#### Power Plant Has Many Exclusive Features.

The power plant has six cylinders,  $4\frac{1}{2}$  by  $4\frac{3}{4}$ , cast in two blocks of three. The crankshaft, which is  $2\frac{1}{4}$  inches in diam-

eter, is supported on seven bearings.

Weight is reduced to a minimum by boring the journals and pins. These hollow pins and journals perform a two-fold object, as they also serve as oil ducts for the pressure lubrication, the ends being

#### SPECIFICATIONS.

**Measurements:** Wheelbase,  $143\frac{1}{2}$  Inches; Clearance, 12 Inches.

**Engine:** Own, Six Cylinder; Bore,  $4\frac{1}{2}$  Inches; Stroke,  $4\frac{3}{4}$  Inches.

**Ignition:** Two Independent High-Tension Ignitions; Accumulators and Magneto.

**Carburetor:** Rolls-Royce Patent and Make.

**Pistons:** Aluminum with Four Rings.

**Crankshaft:** Seven Main Bearings, Machined All Over; Alloy Steel.

**Cylinders:** Cast in Group of Three, No Internal Joints; L-Head Type.

**Valves:** High Chromium Steel; Exhaust and Inlet Valves Interchangeable.

**Lubrication:** Force Feed System.

and is carefully balanced. The surface obtained by the grinding, although nearly a perfect glass finish, is not considered right until each bearing has been lapped in and all minute imperfections of the surface smoothed down.

Bolts instead of studs are used throughout for fixing the bearing caps and cylinders, as well as the bottom half to the case. The bearing caps are made of nickel steel and each cap is carefully spigoted to the crank case.

The crankshaft bearings are bronze shells lined with white metal. Dummy aluminum caps are used for the boring operations, the steel caps which are ground, being fitted afterwards. In this way perfectly true and smooth surfaces are provided both in the steel and aluminum, which receive the ground bronze bearings without the necessity of hand fitting or bedding.

#### No Shims Used in Crankcase.

Liners are fitted between the halves of each bearing, this part of the work being done by highly skilled workmen, who fit them in such manner as to make an oil

**Radiator:** Rolls-Royce, Nickel Silver.

**Clutch:** Internal Cone Type.

**Change Speed Gear:** Four Speeds and Reverse.

**Hand Brakes:** Internal Expanding.

**Foot Brakes:** Internal Expanding.

**Steering:** Worm and Nut.

**Front Axle:** Forging, Chrome

Nickel Steel.

**Rear Axle:** Full Floating Type.

**Shock Absorbers:** Friction Type.

**Wheels:** Wire, Detachable.

**Tires:** 33x5, Straight Side.

**Electric Starter and Dynamo:**

Fitted to Each Chassis. Electric Starter, Own Design, Silent Operating, Low Power Consumption.

plugged by specially designed cone seated caps, which are fastened together by one central bolt in each journal. These caps are carefully ground and seated to make an oil tight joint.

The crankshaft is machined all over

tight joint, which will stand 20 pounds of pressure, between the case and the liner, the liner and the cap and the lever and the shaft.

The solid bronze liner is white metaled where it beds on the shaft and fits exactly. Adjustment for wear, which is almost unknown, is made by reducing the thickness of the liners, as no shims are used. The crank case is supported in the frame in a way which relieves the case of any stresses which might be occasioned by the flexibility of the frame.

The front end is mounted on bell cranks connected by a tie rod, which allows the frame to move up or down without affecting the case alignment. This suspension used by Rolls-Royce is patented, as are many other devices and methods seen throughout the entire mechanical design.

The piston of aluminum alloys is of patented design, having the split skirt referred to which prevents the possibility of knocking when the engine is cold. The piston rings are of the best shape to withstand the gas pressure and are very light. They have a very large wearing surface at the sides with dimensions of  $\frac{3}{32}$  of an inch wide by  $\frac{3}{16}$  of an inch deep. The rings are also fitted with



A Grinding Bay. Very Close Limits of Machining Are Insisted on in Making of Parts for Rolls-Royce Cars.



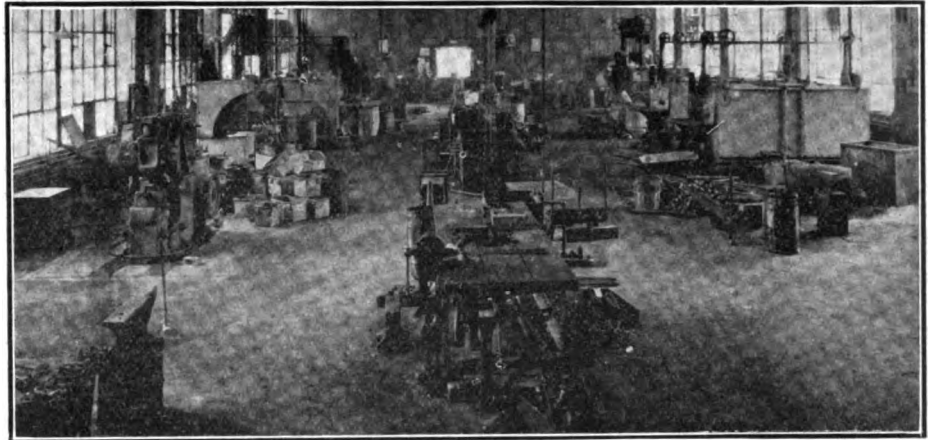
stops which prevent them turning around on the pistons.

There are four piston rings and the bottom ring acts as a scraper, collecting the oil in a channel in the piston, and returning it to the crank case through holes connecting the channel to the inside of the piston. All pistons are made so that the weight of each is nearly exact, and the pistons assembled into each engine are selected in a group, so that their weight is practically identical.

The tappet levers are nickel steel carefully hardened where wear occurs, and are machined all over. The cams are of special design giving constant acceleration to the valves and at the same time allowing the roller to follow the cam and to maintain contact without jumping.

#### **Specially Designed Carburetor for Rolls-Royce Cars.**

The carburetor is patented and designed by Mr. Royce. It has two jets, a low speed and a high speed, with corresponding air passages. The low speed jet is on the right hand side of the carburetor and the high speed on the left hand side. It also has an automatic air



**Section of Heat Treating Department. The Experimental Laboratory May Be Seen at the Rear.**

#### **No Castings Used in Rolls-Royce.**

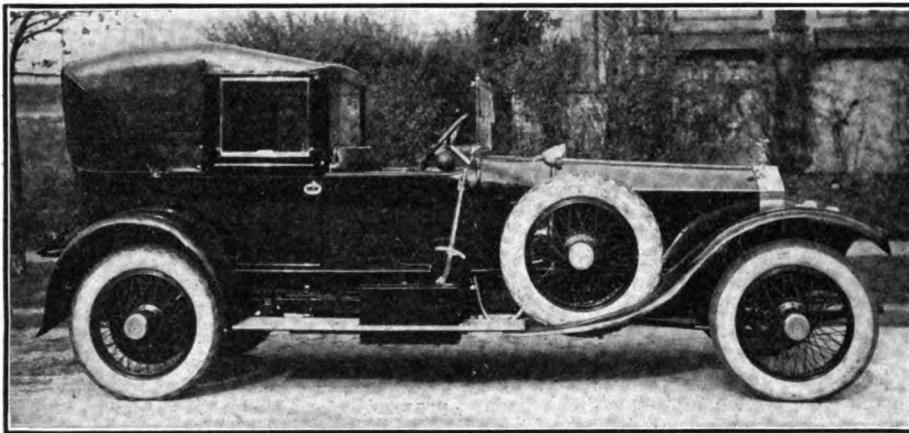
There are no malleable or steel castings used in the entire manufacture of the Rolls-Royce automobile, and the steel forgings from which every part, great or small, is machined, are produced in the rough from the steel mills under

All steels are melted to exact specifications. The metallurgist examines the materials at the mills before the makers are allowed to proceed with rolling and forging. Physical and chemical tests are made of each melt before the steel is put into the forgings. Samples of the forgings are again tested both chemically and physically to see that the process has given satisfactory results, all parts being tested after heat treatment.

#### **Unusual Method of Case Hardening Gears.**

If the whole of a gear is hardened the material of which it is composed must necessarily be reduced in toughness. It is necessary only to harden the outside or case of the metal, thus leaving the strength of the inner part at its highest point of efficiency. This is done in various ways, but the Rolls-Royce method is to rough machine the part to be hardened, leaving a large amount of metal where it is not required to be case hardened.

The piece is then carburized on the surface by packing it in a carbonaceous material and subjecting it to a long period of heat. After being carburized the excess material on surfaces required to be soft is removed and the gear or piece is again heated in a neutral atmosphere and quenched. This final quenching process case hardens the wearing parts and toughens the remainder.



**The Rolls-Royce Cabriolet Emphasizes a Smart and Comfortable Design for Which There Is a Growing Demand.**

valve which not only controls the extra air supply, but also the vacuum and "cutting-in" point of the high speed jet. The whole arrangement is so constructed as to keep the ratio between air and gasoline constant over all ranges of speed. Very fine and accurate adjustments are provided for both the jets and in addition they may be adjusted from the steering wheel post.

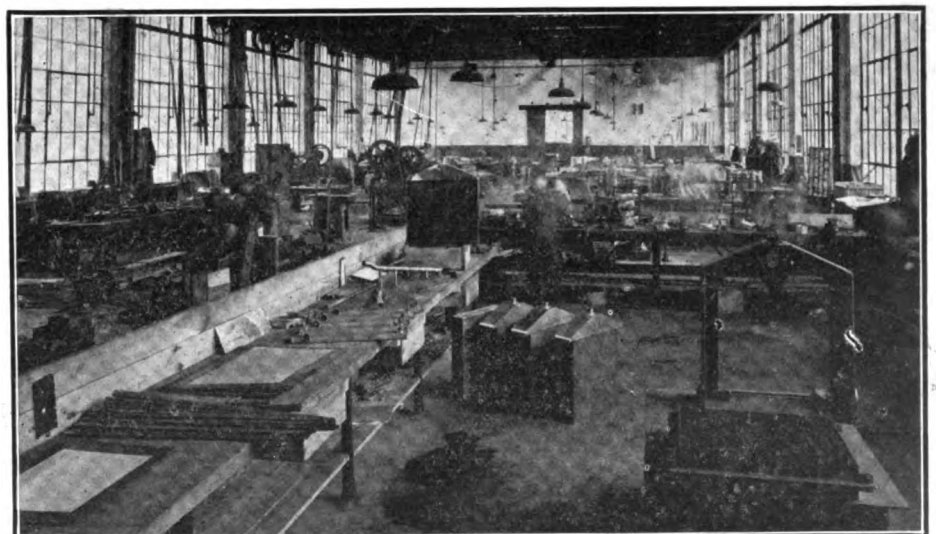
The throttle is of the piston type with a long guide to insure ease of operation, together with long life. The throttle chamber is hot water jacketed and the throttle can be dismantled in a few seconds by unscrewing a knurled nut, the air valve being withdrawn as easily for cleaning. The float and float mechanism are of unique design.

#### **Centrifugal Governor Is Characteristically Rolls-Royce.**

Another characteristic of the Rolls-Royce is the centrifugal governor, which operates the throttle. This is set by the hand lever on the steering column to run the engine at any desired speed. When the accelerator pedal is depressed, however, the action of the governor ceases, until the pedal is released. This naturally makes for a saving in gasoline.

the direct supervision of a metallurgist from the Rolls-Royce laboratory.

This supervision is very exacting and commencing from the steel mills may be outlined about as follows:



**Radiator, Tinsmith and Metal Shop. Special Attention Is Paid to This Phase of Manufacture.**

Only a special analysis of low carbon nickel steel made by the electric process for case hardening is used, no mild steel entering into gear construction.

#### Summary of Manufacturing Standards.

The following are typical examples of the care exercised in the manufacturing process of the Rolls-Royce car.

1. Every nut on the car is bedded down into position and is not allowed to bed on the corners only.

2. Each piece on the car, where possible, is machined or filed to find flaws or cracks in the metal, and every piece on the car is examined with a magnifying glass to discover surface cracks.

3. Square headed bolts are used throughout, instead of hexagonal. This insures that the spanner will be used and the square head of the bolt can never become round through mal-treatment.

4. Spring washers are carefully tested and retempered if necessary. They are only used for locking nuts external to the mechanism. All nuts in inside positions are locked with split pins engaging with castellations in the nut.

5. Split pins are fitted so that the head lies in the castellated portion of the nut and does not protrude, making an ugly projection, which catches and tears rags or one's hands when cleaning.

6. No filling or blow holes or defects in castings are allowed, although in many cases the blow holes would not affect the utility of the piece. Blow holes in white metal bearings are not allowed, although they are difficult to overcome. Only perfect castings are allowed.

7. All rotating parts are carefully balanced. This includes all the gear wheels, fan, flywheel, crankshaft, road wheels, brake drums, axle bevels and other moving parts.

8. All clearance holes and lightening holes bored in brackets and tubes are carefully machined to a smooth finish to avoid the possibility of a rough finish starting a fracture.

9. No sharp corners are left on any piece, and large radii are allowed on shafts and bolts.

10. Tapered bolts are fitted into reamed tapered holes where the stresses are such as to loosen a parallel bolt.

11. A regular jaw and hardened pin for every link joint is used no matter how small or insignificant the joint may seem.

12. Pistons are tested for porosity under a pressure of 600 pounds.

13. Rear axle bevel gears are tested for balance as well as quietness.

14. The gear box is run in and carefully tested for quietness.

15. The crankshaft is tested under oil pressure to see that all the plugs and joints for oil ducts are perfectly tight.

16. The connecting rod is tested in a similar way.

17. All magnetos are tested for efficiency of spark.

18. Carburetors are tested for porosity and efficiency.

19. Floats are tested for leaks.

20. Carburetor jets are tested to be sure that the proportions between air and gas is correct.

21. Gasoline tanks are tested under water to see that they are perfectly air tight.

22. Radiators are tested under pressure.

23. All road springs are tested in a special machine for deflection and load.

24. All spiral springs are tested for load and deflection.

25. All water pipes are tested.

26. All electrical units such as switches, coils, cut outs and starting motor are tested for electrical efficiency.

27. Fan and dynamo belts are run to take the initial stretch out of them.

28. Magneto drives, as well as other drives, are tested for concentricity, and in each case special apparatus has been designed for carrying out these tests efficiently and accurately.

#### All Foremen Positions Filled by Employees of English Factory.

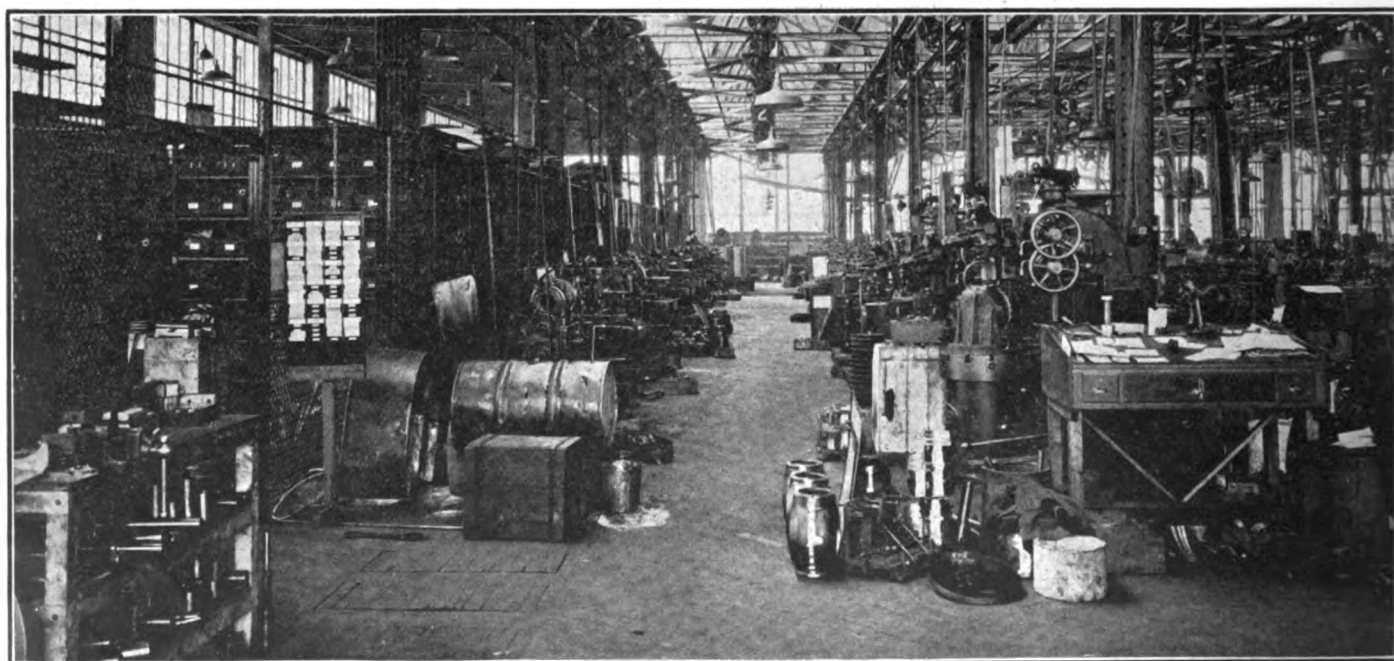
The Springfield, Mass., plant of the Rolls-Royce Co. of America is located in that part of the city known as Hendeeville. This section has long been noted for its superior craftsmen and Rolls-Royce has been especially fortunate in enlisting the services of many who have been trained in the very fine manufacturing of Springfield. All foremen positions are filled by men who have come direct to the new plant from the Derby, England, works. There are about 50 of these superintendents who, though still young men, have been employed exclusively in building Rolls-Royce for periods in excess of 10 years. Under their able direction the weekly quota of eight finished chassis is going forward in satisfactory manner and may be increased by half within a short time.

The executives and officers of the Rolls-Royce of America, Inc., are as follows:

President, L. J. Belnap; treasurer, H. C. Beaver; sales and advertising manager, S. De B. Keim; chief engineer M. Olley; general superintendent Thomas Nadin; works manager, George Bagnall; engineer, John Sopthern; chief tester, W. H. Hulley; purchasing agent, N. H. Manning.

The production of the English factory is sold out for two years. This despite post-war conditions, and the consequent of a tightened money supply. All of which speaks highly of the satisfactory service which this car has given to English owners for a period of 17 years. It is undoubtedly prophetic of what will obtain in this country.

In any event Rolls-Royce gets a substantial start in its conservative marketing campaign as the direct result of all the years of sterling performance, and proves once again that America has a well developed market for the truly high grade car.



The Rolls-Royce Chassis is Manufactured in its Entirety at the Company's Plant, All Work Being Done Under the Supervision of Rolls-Royce Engineers. Many of the Machines Used Have Been Especially Designed for the Work. This Illustration Shows a Battery of Automatics.

## New Chalmers Coupe Distinctive in Design

**T**HE Maxwell Motor Co., Inc., Jefferson avenue, East Detroit, Mich., manufacturer of Maxwell and Chalmers passenger cars, announces a new Chalmers coupe, which is stated as being one of the most distinctive closed cars of the season.

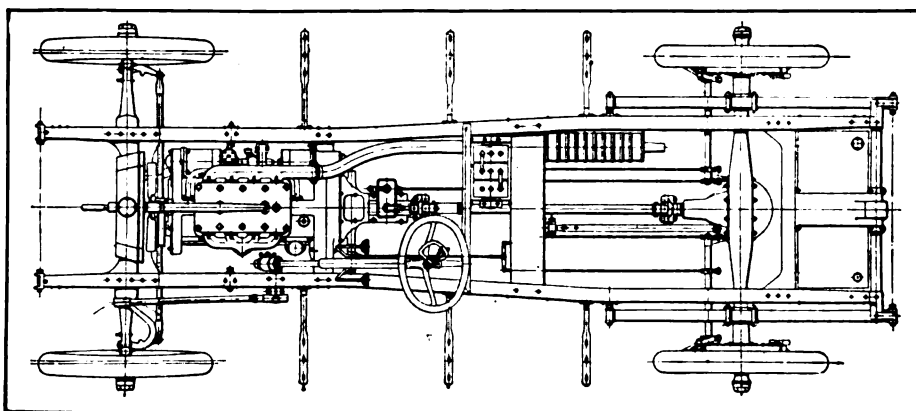
In every particular this fine coupe shows evidence of careful planning on the part of its designers to give the utmost in comfort and convenience, as well as in practical utility.

The upholstery is a combination of silk and mohair, rich in appearance, yet durable and in good taste, and with an excellent carpeting to match.

A dome light, modern window lifts, a windshield visor and ample door pockets are numbered among its many desirable features.

### Specifications.

**Color**—Body, Blue; Running Gear, Black.  
**Seating Capacity**—Four, Folding Seat in Corner for Fourth Passenger.  
**Position of Driver**—Left Side.  
**Wheelbase**—117 Inches.  
**Tread**—56 Inches.  
**Wheels**—Wood.  
**Front Tires**—32x4 Inch.  
**Rear Tires**—32x4 Inch.  
**Service Brake**—Contracting on Rear Wheels.  
**Emergency Brake**—Expanding in Rear Wheel Drums.  
**Cylinders**—Six, L Head Type; Vertical, En Bloc.  
**Horsepower**—25.35 (N. A. C. C. Rating).  
**Bore and Stroke**—3¼x4¼ Inches.  
**Lubrication**—Force and Splash.  
**Radiator**—Cellular.  
**Cooling**—Thermo Syphon.  
**Ignition**—Storage Battery.  
**Starting System**—Two-Unit.  
**Starter Operated**—Gear to Flywheel.  
**Lighting System**—Electric.  
**Voltage**—Six.  
**Wiring System**—Single.  
**Gasoline System**—Vacuum.  
**Clutch**—Dry Multiple Disc.  
**Transmission**—Selective Sliding.  
**Gear Changes**—Three Forward, One Reverse.  
**Drive**—Spiral Bevel.  
**Rear Axle**—Semi-Floating.  
**Steering Gear**—Worm and Gear.  
**Equipment**—Includes Windshield, Speedometer, Ammeter, Tire Pump, Electric Horn and Demountable Rims.



Top View of Chassis of Reid 16-Valve Four Which Is to Be Distributed Under New Plan by M. R. Motor Car Co.

### REID SIXTEEN-VALVE FOUR OFFERS NEW DISTRIBUTING PLAN.

The M. R. Motor Car Co., 521 Caxton building, Cleveland, O., announces a new distributing policy which it intends to follow in producing and marketing the Reid 16-Valve Four, a newly designed passenger car.

Plans are at present being worked out which will allow the shipping of complete sets of parts for these cars to local assemblers who will assemble and finish the cars, selling them under their own name, plus the company's name, in their respective territories, each assembling concern being entirely separate and having exclusive territory.

To each assembling concern will be furnished a complete demonstrating car, blue prints of the complete engineering work necessary to assemble the car and also an expert mechanic for several months.

### Specifications.

**Wheelbase**—112 Inches.  
**Motor**—Four-cylinder, T Head; Cylinders Cast en Bloc. Sixteen Valves, Two Intake and Two Exhaust to Each Cylinder; Detachable Cylinder Head. Cylinder Block One Piece from Head to Center of Crank Shaft.  
**Bore and Stroke**—3¼ by 5 Inches.  
**Crank Case**—Aluminum.

**Cooling System**—Centrifugal Pump.  
**Motor Lubrication**—Force Feed Splash and Gravity.

**Ignition and Electrical Equipment**—Westinghouse Two-Unit System.

**Generator**—Positive Gear Driven from Crank Shaft, Right Front Side of Motor.

**Starting Motor**—Mounted in Line with Generator, Right Rear Side of Motor; Bendix Drive.

**Steering Gear**—Left Hand Side; Worm and Gear. 18-Inch Steering Wheel; 1¼-Inch Column.

**Clutch**—Single Plate Type.

**Transmission**—Selective Type; Three Speeds Forward and Reverse.

**Front Axle**—I Beam Section Drop Forged.

**Rear Axle**—Three-Quarter Floating Type.

**Service Brakes**—14-Inch Adjustable External, 2-Inch Face.

**Emergency Brakes**—Internal Expanding, 2-Inch Face.

**Springs**—Front Seven Leaves, 2 Inches Wide, 35 Inches Long; Rear, Nine Leaves, 2 Inches Wide and 52 Inches Long.

**Gasoline System**—Gravity Feed from Vacuum Tank to Carburetor; 15½-Gallon Tank at Rear.

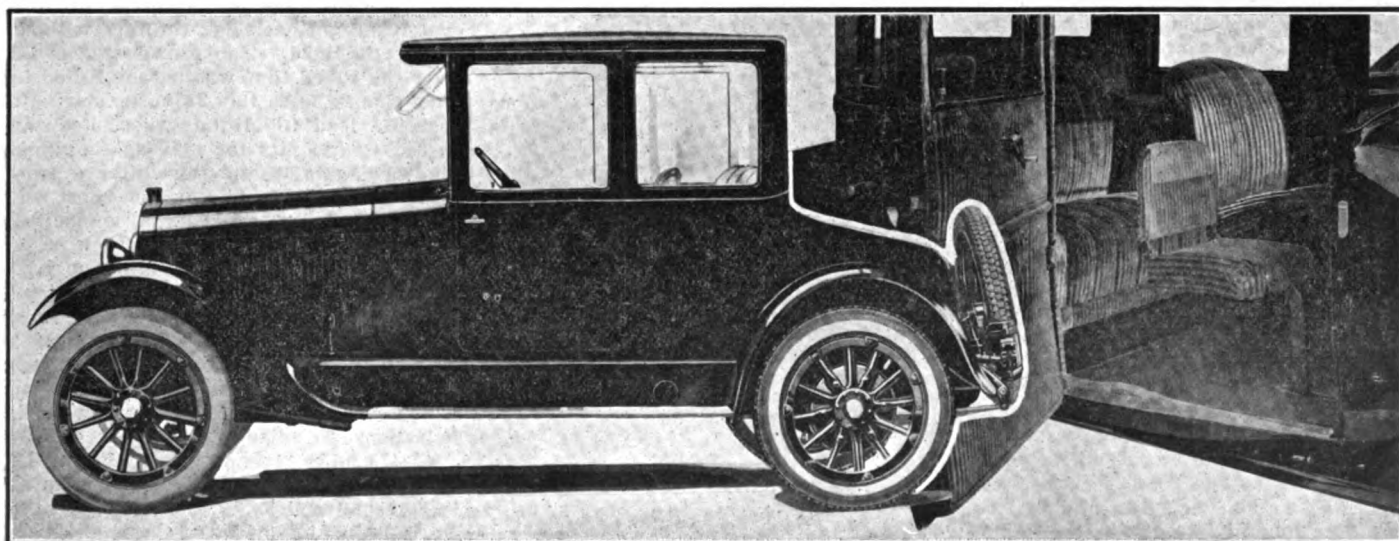
**Wheels**—Wood Wheels, 12 Spokes Rear, 10 Spokes Front. Disc Wheels at Additional Price.

**Tires**—Straight Side, 32 Inch by Four Inch.

**Bodies**—Pressed Steel.

**Instruments**—Clock, Speedometer and Ammeter on Dash Board.

**Windshield**—Rigid, Side Frame Construction.



Quality and Dignity Are Apparent Throughout in the Design of the New Chalmers Coupe—Plenty of Room and Comfort Provided for Four Passengers.

# American Cars Take All Big Money at Big International Sweepstakes

(By P. J. HIPES.)

**D**RIVING a Frontenac, Milton won the Ninth International Sweepstakes at Indianapolis, Ind., May 31, before the largest crowd ever assembled for a sport event in this country, estimated at 150,000 people. His time was five hours, 34:44.65 minutes, an average of 89.62 miles an hour. This sets a new record for cars of 183 cubic inch piston displacement and breaks last year's record made by Gaston Chevrolet, who drove a Monroe to victory at an average of 88.50 miles an hour.

DePalma's record of 89.84 miles an hour in his Mercedes in 1915 still stands as the fastest time made on this speedway in the 500-mile chassis. However, his car was in the 300 cubic inch piston displacement class.

Roscoe Sarles in a Duesenberg finished second with an average of 88.61 miles an hour, while a Chicago-Frontenac Special, driven by Ellingboe, finished third, averaging 85.03 miles an hour. Eddie Miller's Duesenberg finished fourth, being driven by Murphy, with an average of 84.65 miles an hour. The fifth money was made by Haibe in Sunbeam, averaging 84 miles an hour. Another Duesenberg was sixth, driven at the finish by Miller, averaging 83.03 miles an hour. Then came Ira Vail in a Leach Special in seventh place, averaging 80.15 miles an hour. Eighth, Bennett Hill's Duesenberg, driven by Wonderlich, average, 79.13, while Ralph Mulford in a Frontenac was awarded ninth place, being flagged at the end of the 174th lap.

Out of 23 starters only nine cars finished. This is the first time in the history of the speedway that less than 10 drivers failed to receive the checkered flag.

Louis Chevrolet, designer of the winning Frontenac, who also designed the Monroe that won last year's race, was given a lion's share of the honors. Fred Duesenberg also comes in for the laurels. His cars finished two, four, six and eight. These two men proved the superiority of the United States in automobile engineering for out of the nine cars to finish only one foreign car received the checkered flag—this being the English Sunbeam.

The foreign cars showed great speed, but were unable to stand the terrible strain.

Ralph DePalma, in a French Ballot, led the field and set a dizzy pace for 275 miles—and set a new track record for both the first 100 and 200 miles. For the first 100 miles his average was 93.74 miles an hour, while at 200 miles he increased his average to 93.66 miles an hour. With the exception of five laps DePalma won all laps up to the 112th, when he was forced out of the race on account of a broken connecting rod. He

Position, Car and Driver.	Time	Ave.
1—Frontenac, Milton...	5:34:44.65	89.62
2—Duesenberg, Sarles...	5:38:34.30	88.61
3—*Frontenac, Ford...	5:52:50.30	85.03
4—†Duesenberg, Miller...	5:54:24.98	84.65
5—Sunbeam, Haibe...	5:55:58.20	84.00
6—‡Duesenberg, Guyot...	6:01:17.70	83.03
7—Leach Special, Vail...	6:14:17.47	80.15
8—*Duesenberg, Hill...	6:19:06.74	79.13
9—†Frontenac, Mulford; awarded ninth place.		

Twenty-three cars started; nine finished.  
\*Relieved by Burk, who was relieved by Ellingboe.

†Relieved by Murphy.  
‡Relieved by Boyer, who was relieved by Miller.

\*\*Relieved by Wonderlich for last two laps.

†Flagged in 177th lap.  
Chester S. Ricker, director of timing and scoring. Otis A. Porter, official timer. L. Q. Downtain, official scorer. W. D. Edenhurn, A. A. A. representative. C. G. Sinnabough, referee.

had set the pace, but his Ballot was unable to survive the strain. However, for those who attempted to keep pace with him he proved to be their Waterloo, for they too were forced out on account of mechanical trouble.

Joe Boyer in his Duesenberg also deserves credit for the fast time that was made in the early part of the race, for it was a continual duel between him and DePalma for first place. They kept the crowd in the grandstand continually on their feet. Although Boyer was in the lead for only one lap, he followed the speedy Italian so close that no doubt he felt greatly relieved when Boyer was forced out at the 74th lap on account of rear axle trouble.

## Brief Story of the Race.

The 22 starters, which included the



Tommy Milton, Winner of 500-Mile International Sweepstakes at Indianapolis.

cream of the speed wagons, were led for the first lap by H. C. Stutz and Barney Oldfield, official pacemakers. They had hardly pulled aside when DePalma, Sarles and Boyer hit the tape at about 85 miles an hour and the race was on. DePalma won the first lap, but lost the second to Sarles in a Duesenberg, DePalma being second and Boyer third. However, he regained the lead on the third lap, lost the lead to Boyer at 15 miles, but was out in front again on the seventh lap and stayed there for 275 miles. At 50 miles DePalma was first, being followed by Boyer in a Duesenberg; Sarles' Duesenberg was third and Wilcox in a Peugeot was fourth. The average was 92.62 miles an hour.

Wilcox, one of the favorites, driving a Peugeot, was first to drop out. He pulled into the pits on the 23rd lap with a broken connecting rod.

## DePalma Ahead at Century Mark.

At 100 miles DePalma was leading at a speed of 93.14 miles an hour, breaking last year's record of 90.10 miles an hour. Sarles was second, Alley third, Hearne fourth, Milton fifth. Shortly after 100 miles were turned Louis Fontaine's Junior Special left the track on the north turn and crashed tail end into a retaining wall. Neither driver nor his mechanic was seriously injured.

At 175 miles DePalma was still leading followed by Milton and Tom Alley. Milton was forced to the pits on the 77th lap with a broken oil line, but returned to the track after a few minutes and turned several fast laps in an endeavor to overtake the flying DePalma. Two hundred miles were passed with DePalma still in the lead, making the highest average of the day. He had made the distance at 93.66 miles an hour. Alley was second, Sarles third and Milton fourth. On the 88 lap DePalma changed all his tires, took on gasoline, oil and water and got back into the race without losing the lead. The crowd went wild over the speed that was accomplished in this change. At the 275-mile mark he lost the lead to Milton when he was forced to the pits for new spark plugs. He was again in the race after a two-minute delay, but his stay was short for, on the 112th lap, he broke a connecting rod and was through. From then on it was Milton's race. At 400 miles only 10 cars remained in the race. Milton was leading, Sarles was second, Haibe in a Sunbeam third, Ellingboe fourth and Miller in a Duesenberg fifth. The average had dropped to 89.68 miles an hour, which was less than last year's record, it being 90.70 miles an hour.

At 475 miles the speed was 89.74. Milton in No. 2 was first, Sarles in No. 6 was second and Ellingboe in No. 25 was third. Murphy in No. 5 fourth, Haibe in No. 16 fifth, Guyot in No. 9 sixth, Hill No. 21 seventh, Ira Vail No. 3 eighth, and



Mulford in No. 8 ninth. They finished in this same position at the end of the 500-miles with the exception that Ira Vall in No. 3 finished seventh and Hill in No. 21 eighth.

#### Some Noteworthy Facts.

After the race was over the foresightedness of the speedway officials was again manifest in their endeavor to prove to the automotive world the practicability for speed of a car with a small piston displacement over that of the larger one. The cars of 183 cubic inch piston displacement proved their merits. Faster time was made; in fact, Ralph DePalma's Ballot Special only had a piston displacement of 176 cubic inches, and he broke the 100 and 200-mile record, averaging 93.66 miles an hour. In 1911 he drove a Simplex with a piston displacement of 597.2 and only averaged 71.13 miles an hour. Another significant fact, since the 183 cubic inch piston displacement rule went into effect no fatal accidents have occurred.

An interesting feature from an equipment standpoint was that all the cars were equipped with Delco ignition and Oldfield tires.

Fifty thousand dollars in prizes was offered by the speedway—the 10th prize of \$1400 was divided among the losing drivers inasmuch as only nine cars finished.

#### Milton's Career.

Tommy Milton, the winner of this year's Indianapolis 500-mile race, claims St. Paul as his home, and has a very successful past in the racing game. He is hailed as "The World's Speed King," having, according to records of the American Automobile association, driven a Duesenberg on the straightaway at Dayton, Fla., April 27, 1920, at the speed of 159.4 miles an hour. He also holds the world's records on straightaways for half mile, one kilometer and one, two, four and five miles. In last year's 500-mile race at Indianapolis he finished third in a Duesenberg. In the 225-mile race at Uniontown with the same car he was first.

In 1919 the American Automobile association did not announce any official champion. However, Milton was given this honor unofficially on account of his consistent driving. Milton started driving on dirt tracks several years ago and carried off all the laurels in every race of any importance at that time and during the last few years while on the Duesenberg team he has always finished in the money in the big sweepstake races.

#### PIKE'S PEAK RACES TO BE HELD SEPT. 5.

The Pike's Peak automobile races for the \$2000 Penrose cup and cash prizes aggregating \$2100 will be held this year Labor Day, Monday, Sept. 5. The course will be the same as for last year, from the Crystal Creek bridge to the summit of Pike's Peak, approximately 12 miles, 2200 feet, with a flying start not to exceed 200 yards. The events will be under the rules and with the sanction of the American Automobile association.

The races are divided into three events and drivers have the option of

#### PRIZE WINNINGS.

Driver	Purse	Lap Prize	Dayton Labo- r's (Delco)	Oldfield Tire Co.	Total
Tommy Milton.....	\$20,000	\$6,400	\$5,000	\$5,000	*\$36,400
Roscoe Saries.....	10,000	100	2,500	1,000	13,600
Jules Ellingboe.....	5,000	.....	1,250	500	6,750
Edw. Miller.....	3,500	.....	975	350	4,725
Orr Halbe.....	3,000	.....	750	300	4,050
Albert Guyot.....	2,000	.....	550	.....	2,550
Ira Vall.....	1,800	.....	450	.....	2,250
Bennett Hill.....	1,600	.....	400	.....	2,000
Ralph Mulford.....	1,500	.....	375	.....	1,875
Ralph DePalma.....	.....	10,750	.....	.....	10,750
Joe Boyer.....	.....	100	.....	.....	100

\*In addition Milton won the trophies given by the L. Strauss Co., Wheeler-Schebler Co. and Preat-O-Lite Co.

carrying a mechanic. Event No. 1 will be open to A. A. A. classification Class C cars with a piston displacement of 183 cubic inches or less; prizes: cash, first, \$500; second, \$200. Event No. 2, open to Class C cars, with a piston displacement of 183 to 300 cubic inches; prizes: cash, first, \$500; second, \$200. Event No. 3, open to Class D cars with a piston displacement over 300 cubic inches; prizes: cash, first, \$500; second, \$200.

To the car making the best time, regardless of class or event entered in, goes the Penrose trophy. The Penrose silver and gold cup, 43 inches high, is the most magnificent trophy ever offered to the ambition of the automobile driver. The course is to the tip-top of America's most famous mountain and is in fact a boulevard from 20 to 50 feet wide with easy curves and fair grades. The altitude at the summit is 14,109 feet.

The races are being staged at the same time as the mammoth Colorado sports carnival, which includes air plane races from Denver to Colorado Springs, circling the top of Pike's Peak.

#### GRANT CONTEST WINNERS AWARDED RICH PRIZES.

The Grant Motor Car Corporation, Cleveland, has just distributed \$20,000 in cash as rewards to winning dealers and salesmen in its nation-wide sales contest, which began Jan. 1 and closed recently.

Sixteen cash prizes were awarded, three to direct dealers, three to associate dealers and five each to retail and wholesale salesmen. First prize in the direct dealer division of the contest went to the Kepler-Merrell Motor Car Co., Grant dealers in Syracuse, N. Y.; second prize to the Grant-Cleveland Co., Cleveland, and third prize to the Melvin company, Indianapolis, Ind. First prize in the associate dealer division was won by Beamer & Smith, Uniontown, Pa.; second prize by the Grant Motor Sales Co., Akron, O., and third prize by the Parkside Auto Co., Lorain, O.

#### AMERICA TO BE REPRESENTED AT FRENCH GRAND PRIX.

America will this year be represented for the first time in the history of the French Grand Prix automobile race, which is to be revived. Four Duesenberg cars will go to the starting line to meet the cream of the French, English, Italian and Belgian racing creations. The American entries are sponsored by Albert Champion of Flint, Mich., president

of the Old Timers' club, and head of the Champion Ignition Co.

Ralph Mulford, a veteran road race driver, and Jimmy Murphy, who rose from comparative obscurity to stardom during the 1920 speedway racing season, have been selected to drive two of the Duesenbergs, while the other American entries will be handled by Frenchmen—Albert Guyot, who has been seen in action at Indianapolis, and Inghibert.

In addition to Mr. Champion, who is making the entries, Barney Oldfield, the oldest American race driver and head of the Oldfield Tire Co., has contributed a substantial sum to defray the expenses of the American team.

#### REVIVAL OF VANDERBILT AND GRAND PRIZE EVENTS.

The revival of the once famous Vanderbilt and Grand Prize automobile races over the historic courses of Westchester or Long Island is proposed by the New York Automobile Dealers' association.

Since the dismantling of the Sheepshead Bay speedway, New York has been without motor racing of any kind. Recently vigorous interest in a revival of racing made itself manifest, culminating in the appointment of E. S. Partridge by the directors of the New York Dealers' association as chairman of an executive committee to take charge of a racing programme.

Prospect of success is especially favorable, it is believed, because of the fact that the Dealers' association is headed by W. C. Poertner, a racing enthusiast of first water.

#### SAXON-DUPLEX WINS TOUR.

Defeating eight other cars, both fours and sixes, including some even up to the \$2500 list price, the Saxon-Duplex, which was entered in the Los Angeles Camp Curry Economy run into the Yosemite valley, was awarded first place in class two after going through some of the most severe conditions.

The entire trip was a gruelling workout with snow, rain, hail and with the hubs of the car in mud for the last 60 miles.

"What this Saxon-Duplex did any other stock model will do," states C. A. Pfeffer, president of the Saxon Motor Car Corporation of Detroit, Mich. These cars are equipped with the Saxon-Duplex automatic chassis lubricator, which eliminates all grease and oil cups and lubricates all bearings automatically.

# Prices Cut by 35 Car Manufacturers

**M**ANY additional manufacturers of motor vehicles have during the present month, joined the stampede for lower prices which started early in May. By the first of June some 20 or more makers had announced reductions and, by the middle of the month, the list had increased to include over 30 of the best known makes of low and medium priced cars.

One of the most significant cuts was that on Fords, which carried the prices on all models below the pre-war figures of 1914. For example, the runabout, which sold for \$465 in 1914, is now \$370; the touring car, which was \$490 in 1914, is now \$415. The coupelet sold for \$850 and the sedan for \$975 in 1914 without starter; the present prices are \$695 and \$760 respectively for these models with starters.

Much the same condition is revealed in other lines of cars, as will be seen from the following comparison of present prices with the old:

AMERICAN.			
Body	Type	Old	New
Touring	5-passenger	\$2,395	\$2,195
Touring	7-passenger	2,475	2,275
Roadster		2,395	2,195
Sedan		3,495	3,150
Sport	4-passenger	2,595	2,350
BIRCH.			
Roadster		\$1,689	\$1,595
Five-passenger		1,689	1,595
BREWSTER.			
Roadster		\$7,900	\$7,000
Five-passenger		9,000	7,000
BUICK.			
Touring	5-passenger	\$1,795	\$1,545
Touring	7-passenger	2,065	1,735
Roadster		1,795	1,495
Sedan	5-passenger	2,895	2,435
Sedan	7-passenger	3,295	2,635
Coupe	3-passenger	2,585	2,135
Coupe	4-passenger	2,985	2,325
CHALMERS.			
Touring	5-passenger	\$1,795	\$1,545
Touring	7-passenger	1,795	1,795
Sport		1,995	1,695
Roadster		1,795	1,495
Sedan		2,745	2,445
Coupe		2,595	2,295
CHEVROLET.			
Touring		\$820	\$645
Roadster		795	635
Sedan		1,375	1,195
Coupe		1,325	1,155
Light delivery wagon		820	645
CLEVELAND.			
Touring		\$1,465	\$1,295
Roadster		1,465	1,295
Sedan		2,475	2,295
Coupe		2,375	2,195
COLUMBIA.			
Roadster		\$1,945	\$1,795
Touring		1,795	1,795
Coupe		2,895	2,495
Sedan		2,895	2,595
DIXIE FLYER.			
Touring		\$1,595	\$1,445
Roadster		1,595	1,445
Sedan		2,570	2,345
Coupe		2,570	2,295
Speedster		1,895	1,795
DODGE BROTHERS.			
Touring		\$1,285	\$985
Roadster		1,235	935
Sedan		2,150	1,785
Coupe		1,900	1,585
DORT.			
Touring		\$1,215	\$1,115
Roadster		1,215	1,115
Coupe		1,865	1,685
Sedan		1,995	1,885

ELGIN.	
Touring	\$1,775
Scout, 4 pas.	1,895
Sedan	2,795
Coupe	2,795

ESSEX.	
Touring	\$1,595
Roadster	1,595
Cabriolet	2,100

FORD.	
Touring	\$440
Tour., start. and dem. rims	510
Runabout	395
Runabout, start., dem. rims	465
Sedan	795
Coupe	745

FRANKLIN.	
Touring	\$2,800
Roadster	2,750
Sedan	3,850
Demi-Coupe	2,950
Demi-Sedan	3,150
Runabout	2,700
Brougham	3,800

HUDSON.	
Phaeton, 4-pas.	\$2,400
Touring, 7-pas.	2,400
Cabriolet	3,000
Coupe	3,275
Touring Limousine	3,625
Limousine	4,000

HUPMOBILE.	
Roadster	\$1,665
Touring, 5-pas.	1,685
Coupe	2,725
Sedan	2,800

JORDAN.	
Touring, 5 pas.	\$2,650
Touring, 7-pas.	2,875
Roadster	2,650
Brougham	3,700
Sedan	3,700

KISSEL.	
Coupe	\$4,275
Sedan	4,275

Prices on roadster and seven-passenger touring remain unchanged.

LAFAYETTE.	
Touring	\$5,625
Roadster	5,625
Sedan	7,400
Coupe	7,200
Limousine	7,500
Torpedo	5,625

LINCOLN.	
Touring	\$4,600
Phaeton	4,600
Roadster	4,600
Sedan	6,000
Coupe	5,750

MAXWELL.	
Touring	\$995
Roadster	995
Sedan	1,695
Coupe	1,595

MARMON.	
Speedster	\$5,300
Coupe	6,150
Sedan	6,600
Limousine	6,800
Town Car	6,800

OAKLAND.	
Touring	\$1,395
Roadster	1,395
Coupe	2,065
Sedan	2,065

NORWALK.	
Five-passenger	\$1,285

OVERLAND.	
Touring	\$895
Roadster	895
Coupe	1,425
Sedan	1,475

PAIGE.	
6-44 Models.	
Glenbrook touring	\$1,795
Lenox roadster, 2-pas.	1,795
Ardmore sport, 4-pas.	2,015
Sedan	2,720
Coupe	2,600
6-66 Models.	
Lakewood touring	2,895

Larchmont sport, 4-pas.	2,995	2,975
Sedan	3,850	3,830
Coupe	3,775	3,755
Limousine	4,050	4,030
Daytona roadster	New type	3,295

RALEIGH.	
Three-passenger	\$2,750
Five-passenger	2,750
Coupe	3,600
Sedan	3,700

**SAXON-DUPLEX.**  
Average reduction of \$180, which makes the new prices \$400 to \$500 under those for 1920.

SCRIPPS-BOOTH.	
Touring	\$1,545
Roadster	1,545
Sedan	2,295
Coupe	2,215

SENECA.	
Touring, 5-pas.	\$1,185
Roadster	1,185
1000-lb. truck	1,185

SHERIDAN.	
Touring	\$1,685
Roadster	1,685
Coupe	2,565
Sedan	2,765

STUDEBAKER.	
Light Six Models.	
Touring	\$1,485
Roadster (new model)	1,300
Coupe Roadster	1,850
Sedan	2,150

Special Six Models.	
Touring	\$1,750
Roadster, 2-pas.	1,750
Roadster, 4-pas.	1,750
Coupe	2,650
Sedan	2,750

Big Six Models.	
Touring	\$2,150
Coupe (new model)	2,850
Sedan (new model)	2,950

TEMPLAR.	
Touring	\$2,885
Roadster	2,885
Sportette	2,885
Sedan	3,785
Coupe	3,785

WILLYS-KNIGHT.	
Touring	\$2,195
Roadster	2,195
Coupe	2,545
Sedan	2,945

## CENSUS SHOWS GREAT INCREASE IN AUTOMOTIVE INDUSTRIES.

A preliminary statement of 1920 census of manufactures which has been issued by the Census Bureau, United States Department of Commerce, compared with 1914, shows the increase in the number of establishments engaged in the automotive industry as well as in the value of the products.

The number of establishments making automobiles in 1919 was 315 as compared with 300 in 1914, but the value of the product increased from \$503,230,000 in 1914 to \$2,387,833,000 in 1919. The figures for establishments making automobile bodies and parts are as follows: 1919—2394 factories, value of products, \$673,590,000; 1914—971, making goods to the value of \$129,601,000. Automobile repair establishment—15,486 in 1919, value of product, \$222,596,000; 1914—3273 establishments, \$29,920,000. Agricultural implements, 1919—519, \$304,939,000; 1914—601, \$164,087,000. Aeroplanes, sea planes air ships and parts: 1919—31, \$14,373,000; 1914, 16, \$790,000.

# Power Equipment Main Stay of Modern Repairer

***Educated Motorists Demand Machine Repairs with Saving of Time and Money—Repairer Now Called On as Never Before to Turn Out Jobs by Efficient Methods—How Are You Fixed to Handle Your Trade?***

THE average repair bill for each of the cars and trucks that have been in service for more than one year is said to be in the neighborhood of \$1 a day. This figure is staggering when viewed in an abstract manner and the hasty reader is apt to lay the blame at the door of the manufacturer. But it isn't the manufacturer's fault by any manner of means. High class engineering has developed the automobile to a place where it is well nigh perfect. It would need almost no repairs if road conditions were as they should be, but it is impossible to function forever without need of an occasional visit to the repair shop and it is here that the blame for high repair expense originates.

The same class of engineering brains that have developed the automobile to its present efficiency have apparently not been used in repair shops of a certain class, and we find that hand methods are frequently at fault for the high cost of repairs. The automobile manufacturer has in a sense been forced to employ efficient time and labor saving machinery in the construction of the automobile, because of the exigencies of competition and the fairly close margin of profit. Just the opposite has held true in the repair business, however, and there is a certain class of repairers who, turning out work by the hour, have been more than satisfied with hand repair methods

for the very reason that they allowed them to charge the customer for more time and consequently to make more money.

## **Lack of Proper Shop Equipment.**

To be sure, a great deal of this unnecessary expense may be directly traced to poor mechanics, but the real source of the evil lies in the fact that there has been a lack of time and labor saving shop equipment. The average repair shop owner has been satisfied with a few common tools with which to do business and the reader probably knows of some shop not far from where he lives that has almost no stationary equipment of any kind, but relies almost wholly on such tools as wrenches, screw drivers, saws and cold chisels, and the assortment is frequently in poor condition at that.

Such repair shop owners do not want to save time. They have absolutely no desire to shorten the period of labor. They, as well as the customer, know that they are charging too much for the work done, but very short-sightedly figure that they are making more money by doing business in this manner. As a matter of fact they are really losing the customer's future trade, his respect and his good will, and the latter asset is the greatest that they can have if they are ever to become known as the best in their own particular line of business, and

to lay a foundation for a prosperous future.

Consider the two men in the picture on this page. The artist has shown in a few lines the great difference in the two kinds of repair shop owner. Here we have the sleepy, careless repair man who is getting along on whatever business that comes his way. He makes no effort to better his condition and is satisfied to mull along in a rut. The other is wide awake and up to the times. He has seen the folly of endeavoring to do business by the old methods and has made his shop one of the best in the neighborhood. The result is that he commands the respect of his patrons, keeps their trade and frequently gets business sent to him that he never had any idea of getting—all because he has seen the writing on the wall and has taken advantage of the many time and labor saving machines now on the market for his use.

These machines are not expensive. They don't cost anything at all considered in a certain way. The possession of them calls for an initial outlay and they pay for themselves with interest. Not only the intangible interest that accrues from having a satisfactory business, but in actual cold cash that is legal tender anywhere in this country or abroad. They actually bring money to the dealer instead of taking it from him.



How then can he short-sightedly fail to obtain them? He needs them to do business with.

There are many persons who could well afford to own cars and would buy them today if they felt sure of being

The real high grade repair shop today is run by a big business man who has gone into the business for a life avocation and is building for the future. He employs strictly business methods and his repair equipment is the finest that

duct of the business, but the shop owner will have to analyze his business and decide on the kind of equipment that will best suit his needs.

The car owner of today knows that there is a great deal of machine work that is not only less expensive than hand work, but is really of better quality. He knows that this is true by experience, which means that he cannot be easily disillusioned. In this category might be listed cylinder boring, reaming and grinding, pressing-off gears, burning-in bearings, grinding valves—the list is too long to enumerate and is not necessary to this story because the repairer knows, if he is cognizant of anything at all, just what sort of machine equipment he can make use of in his business.

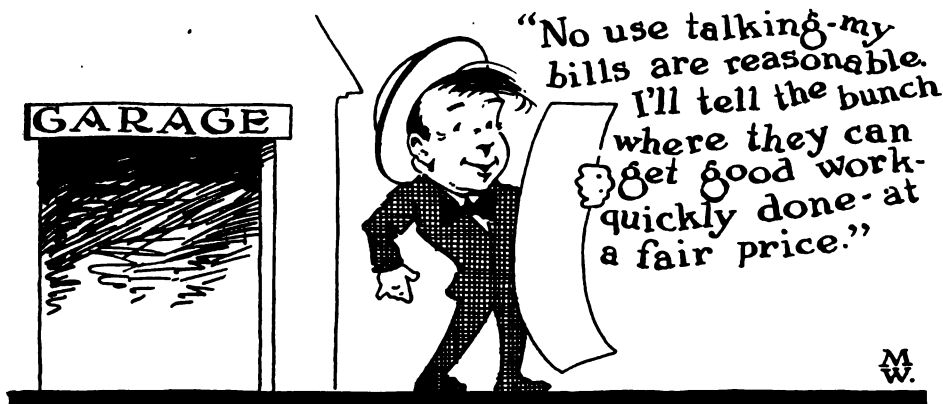
One of the best equipped repair shops that the writer has seen is located in a western city of 100,000 inhabitants, with an additional agricultural territory of 50,000 people to draw on. The owner of this shop was for many years a blacksmith, and a very successful one. In speaking of the manner in which he entered the automobile repair business he said that he "drifted into it" almost against his will.

He was a mechanic of the very highest class and was more than locally known for his unusually fine workmanship. Because of his acknowledged skill he was frequently called on to repair springs and to make different automobile parts for replacements. Almost before he realized just how the change had taken place he found himself established as an automobile repairer and his business as conducted today is an example of everything that an automotive repair shop should be.

Always a very careful, conscientious workman, and like the average blacksmith the world over, unwilling to let a job go away from his shop without first having it exactly as it should be, this man has built up an organization that goes far ahead of the usual repair shop and has in all his dealings fully lived up to the character of the "honest blacksmith" of song and story.

He early realized that he could not do good work by shiftless methods and purchased equipment to properly handle the work to be done. In consequence of this he has all the work he can possibly handle and this is due to the fact that he finishes jobs properly in the shortest possible time, although much credit is also to be given to his very excellent business methods. He has built up a very fine trade simply because he has retained every customer that has ever done business with him, which means that he has added to his permanent business by every job he has done for a new customer.

"The largest business I have," he said in conversation with the writer, "is brought in through former customers. A man will drive up here that I never saw before in my life and he'll ask if we repaired a certain man's car. We look it up and find that we have, and the man leaves his machine to be repaired. That's what I call 'new profits from old repairs,' and I guess that's the whole secret of whatever success I have made."



able to find the proper type of repair man to care for them. This is a deplorable fact, but a true one nevertheless, and will be recognized without going into further detail. If that isn't destructive rather than constructive service, what is it? Motor vehicle owners are now demanding that repairs to their machines be made in the shortest possible time. This means that the successful repair man must install time and labor saving machinery if he is to hold his prestige. Conditions are changing and the repair shop owner must keep pace with the march of progress.

#### Repair Business a Specialized Industry.

The repair business has now reached a point where it is recognized as a specialized industry. Long, slow, hand methods are giving way to machine repairs. This is as it should be and the live dealer welcomes the change. From now on it will be strictly a survival of the fittest. The forward looking dealer has already seen the light. He is purchasing time and labor saving machinery and is turning out the work as quickly as he can. He knows that this is the only way in which his business can prosper. The repair shops of this class will be well filled with work because the satisfied customers will spread the news of their efficiency.

The pirate repair man is driving himself out of business and there will soon be an end to him because of the very fact that his present methods do not bring him sufficient return to pay for the initial installment on new machine equipment. It is only occasionally that this type of man earns enough to much more than pay for his rent and other overhead expenses and the trade as a whole will not have to contend with him for any length of time.

The bad feature is that while he yet exists he is doing a lot of harm to legitimate business through the wrong impression that he is giving to the car owner who has just purchased his first machine and is therefore not wholly educated to the business. But already many of these men are getting back to their own level, which is that of a common laborer and not a mechanic at all.

he can get. He will do much to overcome the bad impression created by the pirate type of repair man and will aid the manufacturers in placing the business on a much higher plane.

#### A Marked Change in Conduct of Repair Shop.

There has been a marked change evident in the conduct of repair shops during the last year and the business is rapidly taking on the character and dignity that entitles it to a place in the front ranks of those who are constantly striving to place the industry on a more stable footing. There are still many men who should be shown the error of their ways, however, and this article is written in the hope that they will profit by reading it.

The manufacturers of automobiles have frequently expressed the opinion that the only way in which their interests as builders of quality machines could be safeguarded would be to open repair shops of their own to service the cars they build, in addition to their regular service stations and to be run on somewhat different lines.

They cannot be blamed for this attitude in a way. It is no joke to expend time, energy and money in the building of a very efficient, high grade piece of merchandise, and then have the work undone by the faulty attention of the independent repair man who is only concerned with the money he can make from handling the job in his own way. At the present time, because of the increased efficiency shown by the repairer, it looks as though there would be no action taken by the manufacturers, as they believe that the last year or two has seen a pleasing development in the business that augurs well for the future, and that eventually the repairing of automobiles will be as highly specialized as the manufacture of them.

#### Individual Proprietor Must Analyze Own Equipment Needs.

There is no set plan that can be laid down for all garages with regard to the kind of equipment they should have. Of course there are certain tools that are absolutely necessary to the proper con-



and the writer agrees with him thoroughly, although the real secret of his success lies in the fact that he gave his customers good, fair treatment and turned their jobs out on time, which last he was able to do because of having the proper power shop equipment. He has done away with hand methods just as far as possible. His power equipment consists of a cylinder grinding machine, cylinder reboring machine, running-in and burning-in machine, grinder stand, electric test outfit, power valve grinder, grinders, power shaper, drills, lathes, electric breast drill, power saw, 21-inch milling machine and drill press.

He also has an adequate small tool equipment and—more important to the writer's way of thinking—he has a well conducted tool crib in which all small tools are carefully stored at the end of each day's work. All tools taken out by the mechanics are charged to the man using them. This is done by means of a metal tag system, which is too familiar to need describing. It is as efficacious as it is simple and works out wonderfully well in the conduct of the station.

#### Laying Out Power Equipment.

In laying out the power equipment of this repair shop the idea has been to use plenty of floor space, although good results may be obtained by using the least space that is consistent with efficient operating conditions. Definite dimensions in regard to the layout of this particular shop cannot be given, but the owner has arranged his machines in such a way as to get the work done with the least effort, a result which he appears to have accomplished in striking manner.

One of the best time and money savers that this man has installed in his repair shop is so efficient in effect and yet so simple of construction that one wonders why it has not been more universally used in repair shops throughout the country.

It is a large, rectangular tank, metal lined, with the outside made of ordinary plank. It is filled with a solution of hot water and strong lye and is used for the economical washing of motors, axles and other miscellaneous parts.

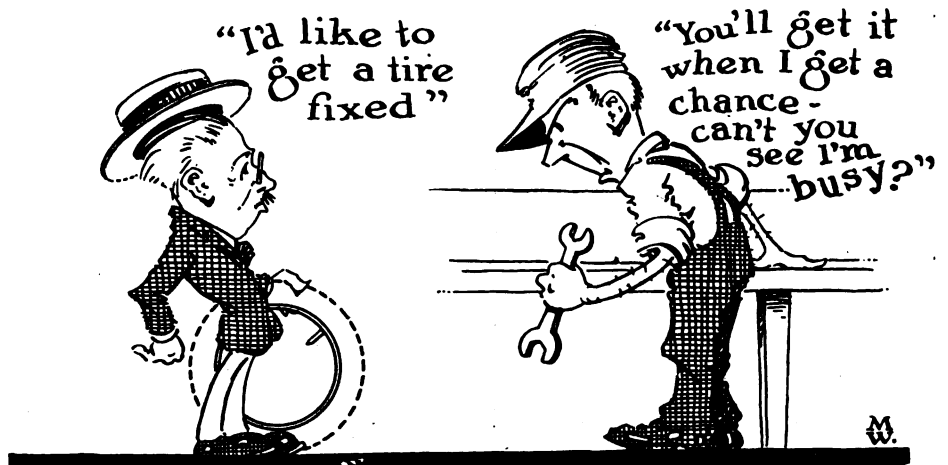
The heavy pieces, like motor blocks and heavy housings, are hoisted up on to a track arrangement by a one-man hoist and are run over to the tank, after which they are lowered into the solution and scrubbed with long-handled brushes, the operation cleaning them in more satisfactory manner than the use of gasoline. "Useful piece of apparatus," explained the shop owner as he was showing the writer through the establishment. "I figured it out one morning when I first started in business and it has more than paid for itself every month I have used it in the saving of gasoline it has made possible."

Going to another part of the repair shop he showed several other pieces of time saving machinery, one of which was especially noteworthy. It was a rocker contrivance which firmly holds any size of automobile in a position that allows the mechanic to work underneath it without the necessity of lying on his back.

"Just got this contrivance," said the proprietor as he gave a demonstration of the manner in which it worked. "Looks like a wonderful proposition—gives a mechanic a chance to use both hands in working from an easy position

#### Cleanliness an Essential Factor in the Repair Shop.

One of the determining elements of good repair shop service is cleanliness, and this is perhaps nowhere worked out in a better way than in the repair shop



and I believe it is going to pay me big dividends. That's the way I figure the cost of a thing—by reckoning what it will make for the credit side of the ledger."

The automotive repair business can use an unlimited amount of such broad-minded, forward thinking men, and it is a pleasure to be able to state that there is increasing evidence that the repair shop owner is doing his thinking in just that way.

The repairer of moderate means might question the advisability of going into an investment in shop equipment to the extent that the proprietor of this service station has. If he does merely a moderate amount of business and figures his future wholly from that basis he will undoubtedly be able to cite reasons why he should not spend the money, but the actual fact of the matter is that the equipment brings the business, and there is no chance for comparisons simply for that reason.

For instance, to cite a case that is analogous. Suppose a man were to start in the trucking business. He might have a one-ton vehicle with which to work. It stands to reason that so long as he had merely the small hauler he could not expect to handle any large contract jobs, whereas if he had the right number of large machines he would undoubtedly get all the work he could handle, provided the work was done properly.

The same thing works out in the repair business. If a repairer has poor equipment and the facilities for handling only a limited class of work, he naturally can't expect to get the large volume of general business until he is thoroughly equipped to take care of it, and the writer has seen so many cases where proper equipment brought the business that he feels honestly justified in advising anybody to spend the money necessary to thoroughly equip the shop, regardless of the status of his business. Good equipment is the best advertisement that the repairer has at his command.

mentioned. The proprietor of this garage believes that cleanliness in the repair shop is indicative of quality service, and thoroughly impresses this feature on his employees.

All cars and trucks are carefully stored in orderly rows when not being worked on and are washed and polished before delivery. All tools and equipment are kept off the floor when not in use. In this garage the work shop is located at the western end of the building and takes up a space of about 1600 square feet. It is well lighted by overhead and side windows and the walls are painted white to enhance the lighting arrangement. All employees, regardless of the sort of work they are doing, are required to change their overalls twice a week and the proprietor pays for the laundering of all overalls and towels.

Clean overalls seem to have a psychological effect on the employees and they keep their tools and equipment well cleaned and polished. They are not allowed to get into a car without putting on a clean frock-like garment and there is therefore never any chance of the owner of the car driving it out and getting his clothing spoiled because of the seats having been occupied by mechanics in soiled work clothing.

All benches used in the shop are covered with sheet metal and are cleaned with a solution from the wash tank twice a week, the work being done by an apprentice, who also oils and greases the cars. The windows are cleaned weekly by a window washing service, which is located in the town, and all rags, waste and other greasy material are thrown into a metal incinerator and burned.

The owner of this repair shop is justly proud of his reputation for a clean establishment and laughingly told of his early efforts to break away from the grime of the blacksmith shop to which he was accustomed.

"Seemed to me that I couldn't get over the idea of associating dirt with the repair business," he said. "Took me some time to divorce the blacksmith shop from

the garage, but it all happened in a funny way. It was shortly after I started in business. I had a rush job for the daughter of a city official. 'Twas a nice little sport car that they had bought in another city and it merely needed tuning up a little.

"Well, my helper—I only had one at the time—had taken the machine out on the road and adjusted whatever was necessary, so I telephoned the owner that it was ready. In about a half hour down she came with another girl and got into the machine to start off. Just then she happened to think that she wanted to telephone and she jumped out again and asked to use my 'phone."

He chuckled reminiscently—"Right then I learned the lesson of a clean shop—the whole back of that girl's clean, white dress was black as your hat where that shiftless mechanic of mine had driven the machine in his old greasy overalls."

The outside appearance of a clean shop certainly draws trade and this is especially true of the transient class of business. A clean overalled mechanic turning the gasoline pump or servicing a

ing courtesy with which the business is conducted.

Regardless of what a visitor's business may be he is treated with unfailing courtesy, and unconsciously becomes a booster for the organization. The surly employee, regardless of his ability, has no place in the personnel of this station, and incivility to customers is not tolerated. It would seem as though this much might be taken for granted in the conduct of any repair shop, but unfortunately the contrary is too often true.

One of the strictest rules of this shop is, "the customer is always right," and it is practised literally. In speaking of this phase of the matter the proprietor of the shop said:

"The average automobile and truck owner has the idea that he knows about all there is to know of his own car, and we don't figure to insult his intelligence in any way, shape or manner.

"We have found that a man may be willing to listen to reason on almost any subject, but just as soon as you try to tell him anything about his automobile it becomes a case of handling him with

## FRANKLIN STILL RUNNING TO CAPACITY PRODUCTION.

Indicative of a continuation of the heavy sales volume which has attended the Franklin car for months past, comes the report from the Franklin factory at Syracuse, N. Y., that the entire production for the month has already been sold out, with the exception of 21 cars. This means that every one of the 920 cars to be built will be in the hands of customers or en route to customers by the first of next month. One of the most hopeful signs of the times, moreover, in the opinion of officials of the company, is that this business was widely distributed over the entire country.

Since Feb. 10 the Franklin factory has been running 100 per cent. normal and has been turning out 40 cars daily.

Coincident with this 100 per cent. normal capacity production comes the information that the building programme includes the completion of what will soon be the largest factory structure in Syracuse. This building, which will be used for both manufacturing and warehouse purposes, is seven stories high and contains 360,000 square feet of floor space.

Rapid progress is being made also with the interior construction work on a new power house, which is to furnish heat, light and power for the entire group of Franklin buildings, 18 in number. This building, the last word in modern power house construction, contains gigantic overhead coal bunkers and the latest mechanism in the way of automatic stokers. A huge switchboard and a series of turbines have been especially designed by the General Electric Co. to take care of this installation.

### Body Plant Reopened.

In order to augment its present supply of bodies the company has reopened its Richmond avenue body plant. This plant, which occupies seven floors and has 65,000 square feet of floor space, has been closed since Dec. 1. By June 1 it was planned to increase the production of bodies to three a day, or at the rate of 75 a month. Employment will be given to 100 men at the body plant, which occupies two large buildings about a mile distant from the main factory, where 3000 persons are employed.

## H. C. BRADFIELD NOW WITH YELLOW CAB MANUFACTURING CO.

Announcement of the appointment of H. C. Bradfield of Detroit as director of sales and advertising for the Yellow Cab Manufacturing Co. of Chicago is made by that company. Mr. Bradfield, who has been president and general manager of the Bradfield Co., Detroit, has discontinued that business and is now with the Yellow Cab Manufacturing Co.

The Yellow Cab Manufacturing Co. in addition to being one of the largest manufacturers of taxicabs in the world, also manufactures Yellow Cab trucks in the  $\frac{3}{4}$  and 1 $\frac{1}{4}$ -ton capacities and a six-cylinder high-grade motor car, the Ambassador. The company is on a capacity schedule for its plant at the present time with no unbalanced inventory or unsold finished stock.

## Good Business

There are more than 9,000,000 cars and trucks in use today. Many of these must go to the repair shop if they are to continue to be used. Motors are knocking, brakes need relining, and the machines must be cared for at once. This means business for the repairman. It means that he will be called on as never before to do good work and do it quickly.

These machines have gone without their usual winter and spring overhauling because their owners were waiting for something that hasn't happened. But you can't run a motor vehicle on a hay wire hitch forever, and the time has now come when these owners are face to face with the fact that they simply must spend money with the repairer. How are you fixed for power equipment to handle your share of this business?

machine at the sidewalk; a freshly swept driveway and clean windows with a bit of fresh paint on the window sills; these things speak volumes and are advertising of the best kind.

The garage is a "sign post on the road that advertises the automotive industry," and the appearance of the garage just as truly advertises the quality of the work it does. No one likes to risk his health in the restaurant that uses soiled tableware and linen, and the car owner hesitates to leave his machine to the mercies of a dirty garage with its slovenly, unkempt mechanics. He knows that the service is usually on a par with the appearance of the shop, and steers clear of it if he is able to do so. A busy broom and judiciously applied hot water make lots of difference.

### Courtesy Plays Important Part in Conduct of Successful Repair Shop.

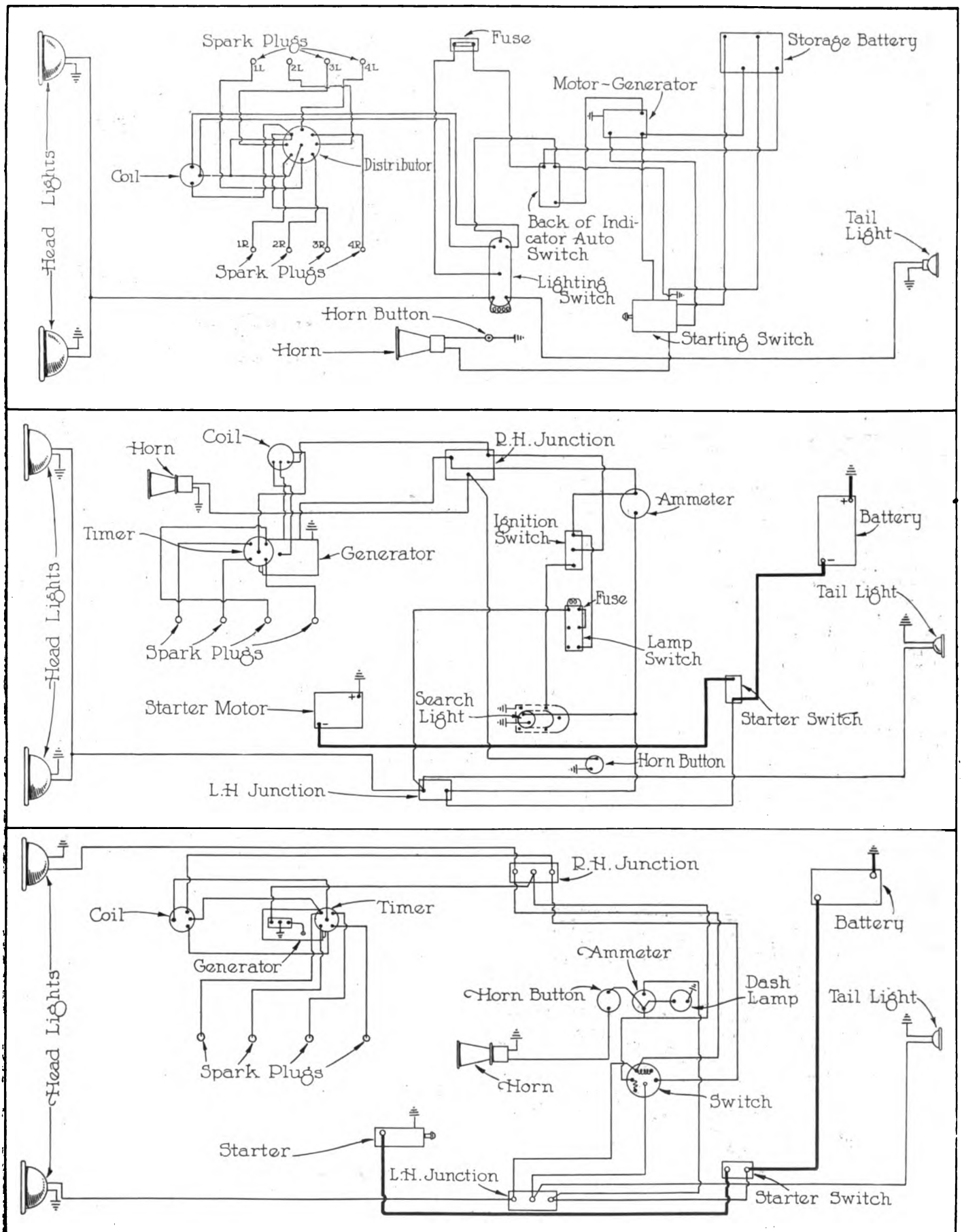
The great success which has always attended the conduct of the repair shop mentioned in this article has, to speak in the abstract, depended in great measure on the personality and principles of its owner, and one of the most marked reflections of this is seen in the unfail-

ing gloves. The only way to deal with him is to talk with him in a courteous manner. You can call it diplomacy or just plain courtesy, but whatever it is, it has done more good to the general reputation of this business than any other one thing I can name, and we insist that every one of the men working here either learns to practise it, or finds himself other employment."

Courtesy certainly does much to keep customers, and the repair shop owner who can honestly claim that he successfully holds the larger number of his customers can safely assume that courteous attention to their troubles has had a lot to do with the fact.

Not every repairer can be as successful as the owner mentioned. Location and environment have much to do with ultimate success, but any repair shop proprietor can analyze his business and handle it from a business like standpoint, and this, provided that equipment and policy are right, will put the intelligent dealer in line for a successful future. The automotive repair business needs high grade repair men and there is room for a whole lot of them everywhere.

# Monthly Wiring Diagram, No. 16



Top—Eriscoe, 1916-8-35; Center—Eriscoe 1917-1918; Bottom—Eriscoe 1919-1920.

## Importance of Caring for Car in Systematic Manner

**T**AKING care of the car by the owner may be made either a pleasure or a task, according to how the owner goes about it. Some prefer to depend on the service station or a near-by garage for this work, while still others derive a great amount of enjoyment from doing the work themselves. Many owners find the task of getting down on a greasy floor to oil or repair the under parts of a car a very distasteful job. But the man who is willing to don overalls, not caring if he does cover himself with oil and grease, and does the work in a conscientious, painstaking manner, will get a large amount of satisfaction from such a task well performed and at the same time obtaining a fund of knowledge that will stand him in good stead later.

Dirt, grease and oil will wash off. Waste should be handy for wiping the hands, while it has been recommended that a small amount of engine oil applied to the hands and rubbed well into the pores will prevent the dirt or grease from entering them and the grease and dirt will readily wash off with sand soap and water, taking the oil from the hands as well.

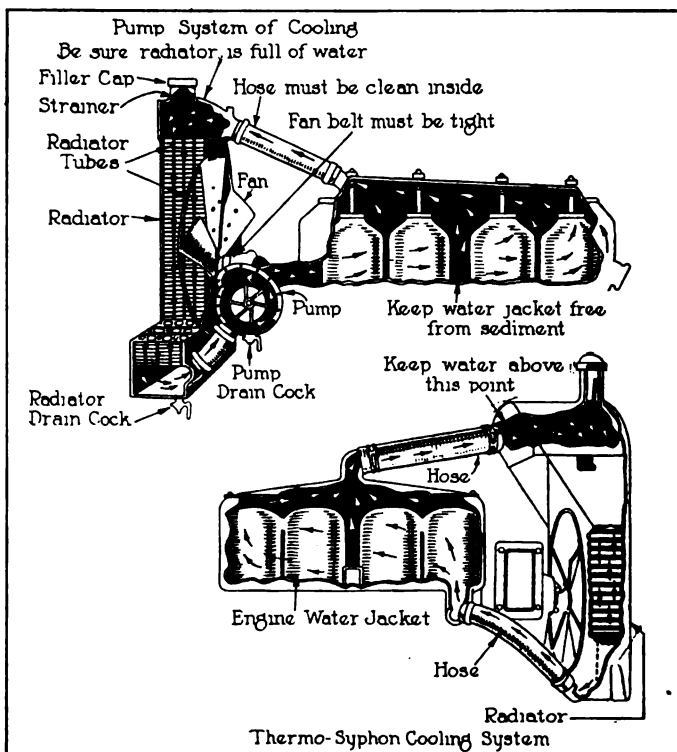
Certain parts of the car require attention every day, or every time the car is taken out. Other components require attention once a week, some once a month and still others only after a run of so many hundreds of miles. The wise man will either take the lubrication chart which came with his car, in some cases consisting of a wall chart and in others of a double page in the instruction book and make a list of the parts that need attention, setting them down in an order that will bring all the things that should be done daily under the daily heading, all of those that should be done weekly under the weekly heading, etc. In this manner all parts that require attention at stated times will be under their proper headings and the owner will always know at a glance whether or not any item has been overlooked.

A most important part of the car and

one that requires daily attention is the cooling system. This includes the radiator, water connections, water pump, if of the forced water pressure type, water jackets of the engine and the fan. If the radiator or any of its connections are in a leaking condition they should be repaired at the first opportunity, as it causes continuous annoyance as long as it is allowed to exist. If the radiator and its fittings are tight, no leaks occurring, about all that is necessary is to note that the radiator is filled each morning before starting the engine.

Twice a year the cooling system of the car should be washed out thoroughly with sal soda, or lye, dissolved in hot water, one-half pound of dye or soda dissolved in five gallons of water and poured into the radiator after the water has been drained out. Operate the engine for a few minutes to circulate and still further warm water, then drain out solution and rinse out with clean water several times till all traces of sediment, dust and soda have been removed. Fill with clean water and the cooling system is again ready for use.

Be sure that the water circulates freely, and that the engine does not overheat. If it does after cleaning the radiator the cause may be found elsewhere. Possibly the fan may not be



**Sediment or Restricted Water Circulation of Cooling System Will Cause Overheating. Prevent This by Flushing Cooling System at Regular Periods.**

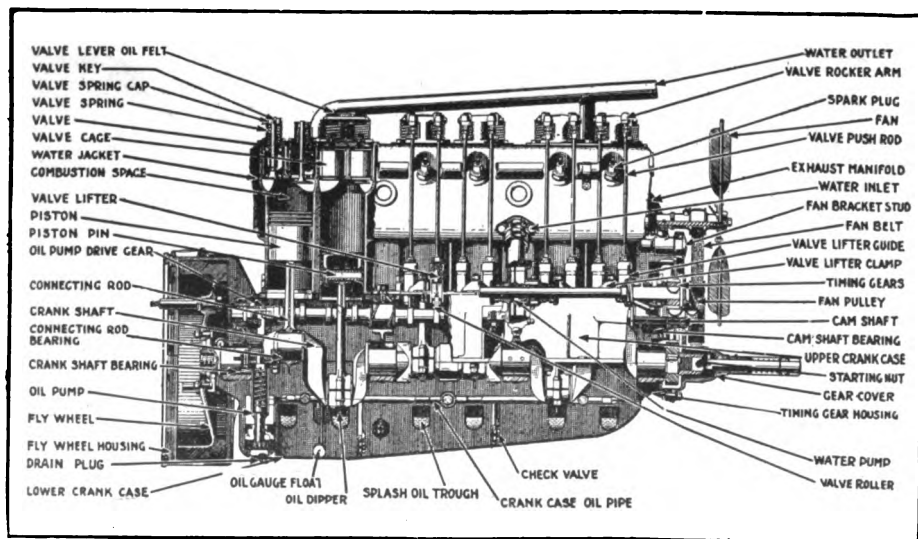
driving up to speed, due to a loose fan belt or broken fan blade. Tighten the belt or replace the fan if the blade is damaged or broken.

### The Engine Next in Order.

The engine should come next. This should be rubbed clean of oil, grease or dust every time the car makes a run of any great distance. Every day when the car returns to the garage after use it is good practise to attend to this at once, if possible, as the grease and oil are hot then and will come off readily. Gasoline or kerosene on a cloth used for this purpose will aid in the work. Of course a kerosene spray gun, operated by compressed air, will greatly facilitate this work if the car owner wishes to go to the expense.

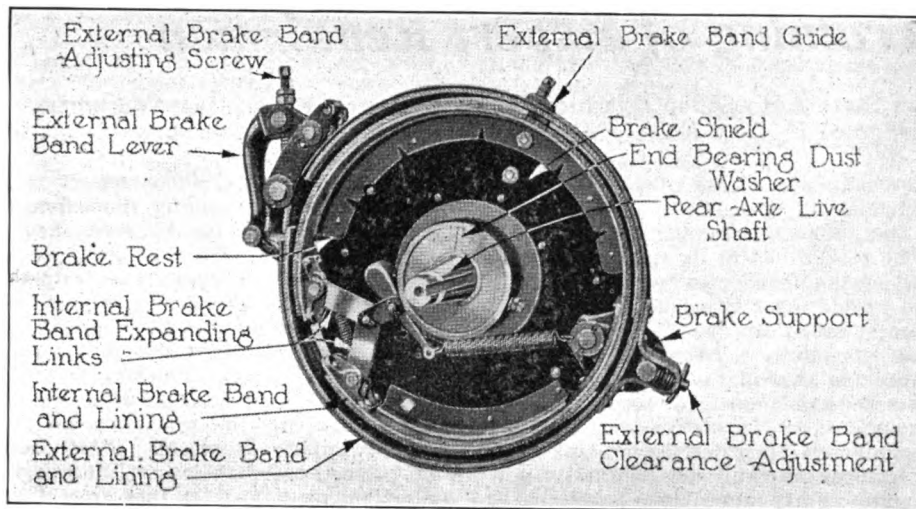
### Watch for Leaks.

Keep the spark plugs and metal parts free from corrosion, in wet weather covering the brasses with one of the cleaning compounds, which can be wiped off later. Watch for leaks about the gaskets; they will occur frequently and cause loss of compression, irregular operation of the engine and are noisy especially around the exhaust manifold. Test with engine oil, squirting a small quantity from an oil cup around the suspected leak, and noting whether bubbles are forced up by the engine compression around the head gaskets, valve caps, spark threads or petcocks. If so they should be tightened till the bubbles disappear, thus improving the compression and increasing the power of the engine. Testing the flanges of the intake manifold between the carburetor and engine oftentimes will show that the oil is drawn



**Examine Engine Closely for Compression Leaks, Etc. It Will Perform Better on the Road and Save Annoyance.**





Adjust Brakes Properly and at Frequent Intervals, Thereby Preventing Accidents and Close Calls in Emergencies.

into the manifold, proving that the joint is leaking and causing irregular action of the engine, as the engine is drawing in more air than needed. Tightening the nuts or fitting new gaskets will obviate this. Fitting new gaskets to the exhaust manifold flanges will stop the noise of the exhaust blowing by the old packing.

Note that all wire terminals are tight; this takes but a few minutes and will prevent irregular action of the engine. Feeling of the wire or shaking slightly with the fingers will quickly determine the tightness of the connections. If the wire connections are in a corroded condition, remove them and scrape the connection with a knife or a piece of sandpaper till they are brightened. Corroded connections hold back the flow of current and offer more or less resistance. When removing connections, take them one at a time and be sure that they are replaced in their proper places and tightened down. The valves need to be ground occasionally, but this should not be overdone. Be sure that the valve caps are screwed down tight and do not leak. Also see that the priming cups and relief cocks are tight and do not leak.

With every car there is furnished a wiring diagram covering the ignition, lights and starter. One may very easily learn, by studying and using the diagram, to trace through each part of the system, when there is anything wrong; broken wires, loose terminals, corrosion at the terminals, grease or oil on the insulation make trouble and looking after these things is a part of the regular care which the car should receive.

Water should be placed in the storage battery, according to the instructions which come with the battery, and if it does not test "full charged" in returning from a fairly long trip, it will be well to ask the battery service station repairer whether the battery needs charging or other attention.

#### Lubrication of the Car.

Lubrication is a very important item in the care of the car and should receive very careful attention from the owner. As mentioned above, tabulate the units of the car that require daily, weekly, monthly and certain mileage attentions,

and live up to this tabulation religiously. There are 100 or more bearings in a six-cylinder car, not including the springs, and places where there is only a slight motion. Every one of these bearings is important, while many are cared for automatically, others are forgotten usually.

#### Washing the Car Very Important.

Washing the car is one of the most important matters for upon the manner in which it is done will depend much of the freshness of the appearance of the outside paint. There is nothing that beats clean water and castile soap for removing dust, oil and grease from the painted surface. A hose with running water is ideal if one will bear in mind to use it without high pressure. The water should be flowed rather than showered upon the painted surface. It may seem odd, but where there is dust upon the car, water under high pressure will drag the grit over the paint, and while the blemish is at first imperceptible, in time the glossy surface is worn off. This is also true if the sponge contains grit or has been used on the running gear and afterwards on the body surfaces. If sponges are used a separate sponge should be provided for the body and another for the running gear, and used exclusively for each. High water pressure also has a tendency to force particles of dust into the varnished surfaces of the body, leaving the surface rough. A newly painted car, or one that has recently been received from the

manufacturer, should have the water flowed on in a small stream at low pressure to harden the finish and make it more lasting.

Where the car picks up grease, road oil and asphalt, principally on the mud guards and the under parts of the car, water will not remove them. A rag dipped in kerosene will soften this material so that it will rub off, but care

must be taken to keep the rag thoroughly clean, otherwise it would be like using sandpaper on the enameled finish. Then the parts must be rubbed absolutely free of kerosene with a dry cloth, otherwise it will collect dust rapidly.

There are good preparations on the market for dressing leather tops, and the use of one of these should be a part of the regular schedule. The top, which is left uncared for, becomes dry and cracks easily and there is nothing more unpleasant than a leaky top. If the cushions are of leather the same preparation may be used. If the top and cushions are of mohair a different preparation will be necessary.

Do not use any "patented" preparation upon the paint or enameled surfaces of the car without first consulting an expert finisher. All sorts of preparations are advertised and many are of course good. They are, however, not necessary on a new car and should not be required for several months. Then usually a rag and linseed oil will restore the polish unless the surface needs refinishing.

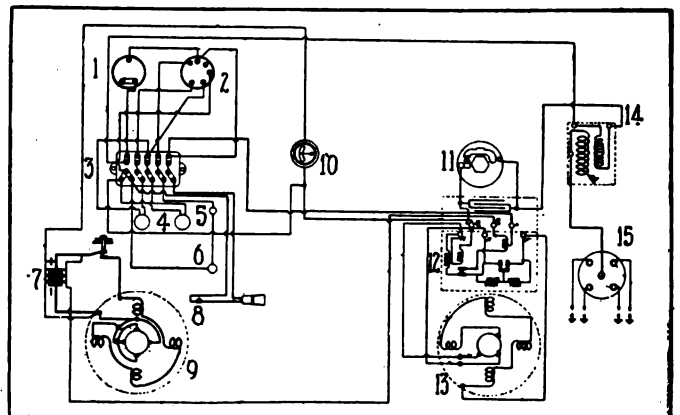
All enameled or highly finished surfaces treated with oil must be rubbed absolutely dry with cheese cloth or waste, otherwise dust will collect quickly.

Many other items might be mentioned in connection with caring for the car in a systematic manner, but attention has been called to enough to give the motorist an idea of what is necessary and how a systematic plan should be made out and followed. The principal thing is to do the work in regular order distributing it throughout the month so that at no time will the task become a long or tiresome one.

#### DEMOUNTABLE RIMS.

When installing a demountable rim on a wheel, be sure that the bead of the rim is just flush with the edge of the felloe all the way around. If the bead and felloe are not even the wheel will have the appearance of wobbling. The lugs should always be drawn up evenly by giving each nut a few turns at a time. Do not tighten one lug before drawing up on the other.

Eight million automobiles supply energy equal to 4,450,000 workers; more than one-fifth of all the wage earners of the country.



Study Wiring Diagram of Car Closely to Become Familiar with Functions.

## Practical Training of Expert Repairmen

Applied Theory as Taught by Michigan State Auto School Produces High Type of First-Class Workmen with Comprehensive Knowledge of Modern Automobile, Truck and Tractor Mechanics.

**T**HE Michigan State Auto school, Detroit, Mich., is one of the best institutions for training automobile, truck and tractor mechanics that the writer has seen. Arthur G. Zeller, president and general manager of this well-established enterprise, has developed a system of instruction that combines the theoretical with the practical, in a manner that results in turning out an unusually high grade of expert repairmen.

The entire mechanism of the automobile of today calls for thoroughly trained men to repair it, and the business cannot be learned properly except by years of careful apprenticeship, or by going to a practical school that teaches the student in a comprehensive manner. The old idea of the apprentice learning at the factory is not favored by the majority of men who are in close touch with the work, as it is now believed that the factory is the place for men who understand the business and will aid in production, rather than spend valuable time in getting a smattering of the work done.

As a matter of fact, current factory treatment as a rule depends for production on piece work. This means that one man does one operation, or at best two or three, and thus does not get an intimate, first-hand knowledge of the mechanics of the entire business as he could have done in years gone by when piece work was not the rule. It, therefore, seems as though the school method of all-round training is the only sure way by which a man may become

thoroughly acquainted with the business, and this will be found to be true.

The automotive industry has now become established in its rightful place as one of the three greatest industries in the world. As a consequence there is a great demand for the skilled workman, and it is safe to say that there are more vacancies awaiting such men than will ever be satisfactorily filled, and the remuneration is fully in keeping with the demand, all of which means that the good mechanic who conscientiously puts his best efforts into his work will always have a good paying position. Incidentally, there is evidence that many of the graduates of the Michigan State Auto school have started directly in the business for themselves and have made good immediately. The day of the "screw driver" repair man is rapidly passing. The mechanic of the future must thoroughly know what he is doing. He should have a working knowledge of every phase of the industry.

The Michigan State Auto school enjoys a well deserved prestige and is said to be highly endorsed by many automobile, truck and tractor manufacturers who believe that the real practical training given by this institution is unusually excellent to fit men for the work they wish to do.

Mr. Zeller, like the broad-minded man he is, did not base the course of instruction offered by this school on his own ideas alone, but enlisted the advice and plans of leading manufacturers, produc-

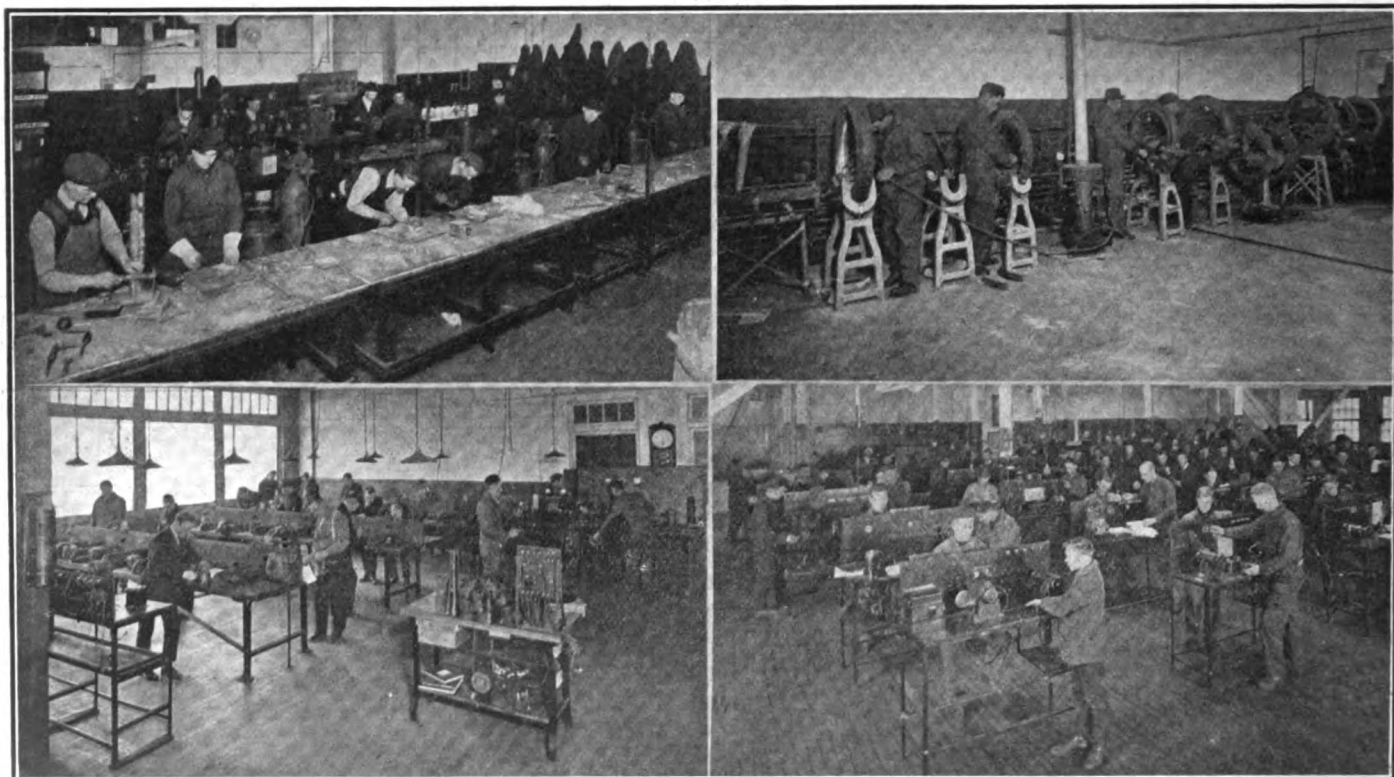
tion engineers, service managers and other officials in preparing the curriculum, and the result has been excellent, confirming emphatically his good judgment. A few years ago the training given by this school was considered too technical, but it is now realized that it was ahead of the times and offers the exact work that is necessary for the present day repair man, all of which is ably proven by the graduates of the school, who are successful, prosperous and respected for their very thorough understanding of the work they are doing.

At the beginning of the course lecture periods of one week alternate with shop practise in one week periods, to enable the student properly to pick up each new subject and thoroughly understand it.

The lecture "periods," however, do not consist entirely of lectures. They are partly practical, as automobile and motor parts and pieces of mechanism are passed around among the students, tests are made, etc.

As an illustration the new student first spends one week in a lecture room, where he has explained to him rear axles, transmissions, steering gears, etc., and everything pertaining to the chassis, with the exception of the motor. The first hour or so of each session in this room is straight lecture. The balance of time is divided between actual handling of parts and questions about them.

After he has passed his examination in this lecture room the new student then goes to the chassis or rear axle de-



Upper Left—Class in Building and Repairing Batteries. Has Prepared Many Students for Successful Operation of Battery Service Stations. Lower Left—Practical Study of Starting Motors, Generators and Magneto. Upper Right—Tire Repair Taught by Use of Modern Equipment. Lower Right—Electrical Demonstration Department Is Complete in Every Respect.

partment in the shop for one week, where he actually works on everything which he has had explained in the preceding lecture room. After being O. K'd in this department he goes to another lecture room, where he spends one week on motors.

From here he goes to the motor department in the shop, where he tears down motors, grinds valves, scrapes bearings, etc. After being O. K'd in this department he goes to still another lecture room for instruction on fundamental electricity, including ignition.

From here he goes to the motor block test department, where he works on motors, timing, setting the points of the magneto, adjusting carburetors, etc., for one week.

From here he goes to still another lec-

attend night sessions in some of the departments if desired.

#### Special Courses.

Special courses in trades allied with the automobile industry are also given at the Michigan State Auto School. These include welding, tire repairing, battery repairing and machine shop practice.

#### Oxy-Acetylene Brazing, Welding and Cutting.

This is a complete training in structural and repair work on all metals, including aluminum, also brazing and cutting. The course includes over 60 hours of individual handling of the torch in actual welding work. The student does not stand around and watch others work, but does the actual work himself and learns by doing. Forty individual weld-

for the exclusive purpose of instruction, and for this reason is undoubtedly more valuable to the student than a course offered as an inducement for the purchase of equipment.

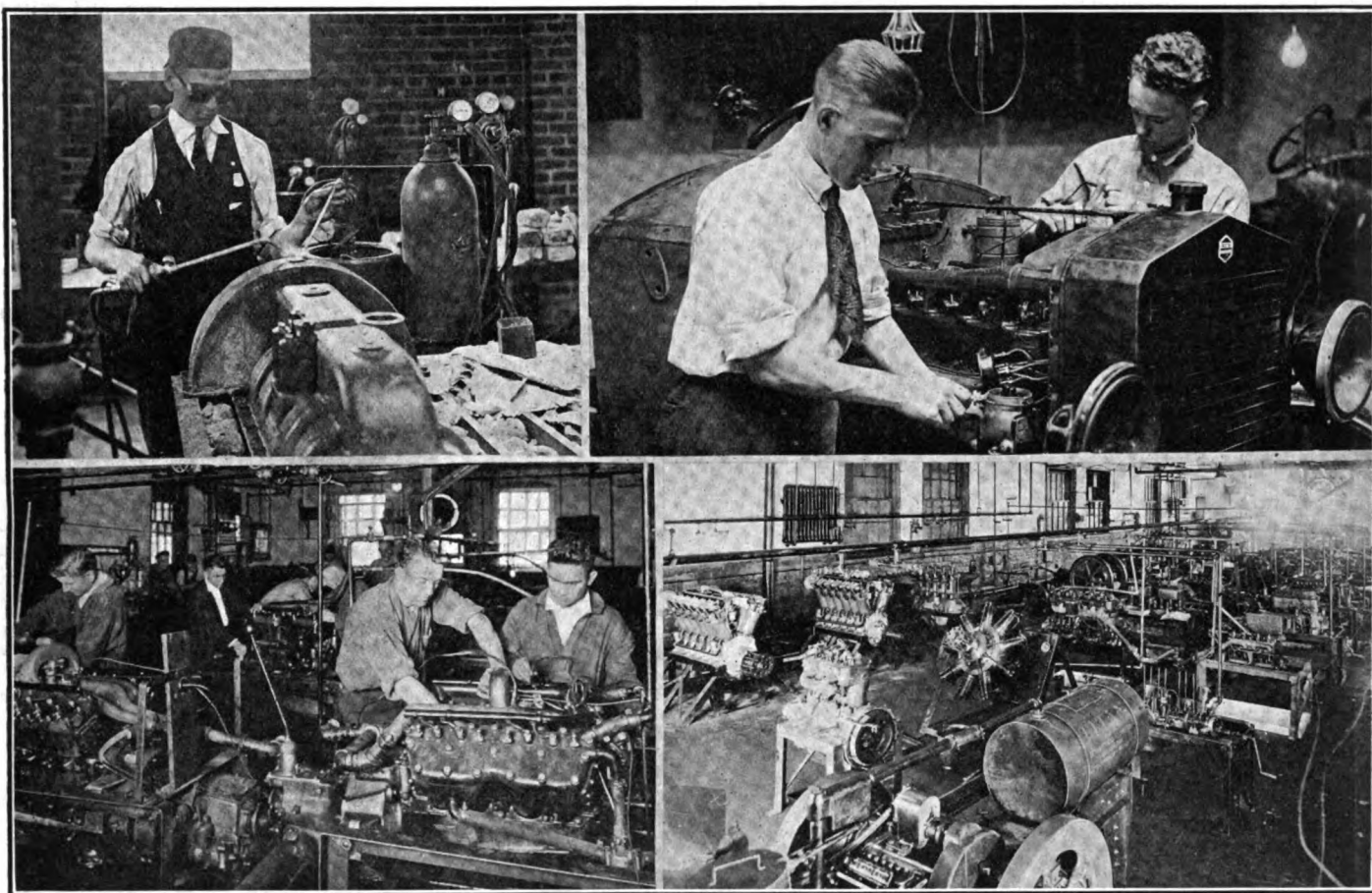
This course not only covers the repairing of tires, but includes tire shop management, pointers on how to get business, etc. Many of the tire course graduates are operating repair shops with exceptional success.

#### Battery Building and Repairing.

In this course the student is given training and experience in battery service, and is qualified to conduct a business of his own in this branch. This is a new course at the Michigan State Auto School, but has been very successful.

#### Machine Shop Work.

This is a course to fit the student to



Upper Left—Welding an Aluminum Crank Case. Lower Left—Block Test Department Showing Students Working on Cadillac Eight and Packard Twin Six. Upper Right—Students Wiring New Car in Electrical Demonstration Class. Lower Right—All Types of Engines Are Available for Practical Study.

ture room, where he is taught the more advanced electricity as applied to the ignition, lighting and starting.

After passing his examination in this lecture room he goes to the electrical demonstration department, where he spends another week on the different ignition, lighting and starting systems. A part of this time is spent in the electrical laboratory, overhauling and repairing all makes of electrical apparatus.

From this department the student goes to the general repair shop for a period of 10 days. His driving lessons are given during this period in the general repair shop.

The shop departments operate eight hours a day. In addition students may

ing outfits are provided for students' use.

The welding course is altogether separate from the other courses. Welding is treated as a trade in itself. The school guarantees to qualify the student as a competent welder or refund the tuition fee. In fact, a similar guarantee applies to all the courses.

Evening classes are offered and are very popular with men who are employed or are taking another course in the day time.

#### Tire Repairing.

This course is a complete training for operating a tire repair shop or for production work in a tire factory. It is separate from all other courses and requires several weeks. The course is given

increase his earnings as a machinist. It includes training on lathes, drill presses, millers, shapers, etc.

#### Cooperation with the Trade.

The Michigan State Auto School is becoming recognized for its spirit of taking special effort to be of service to the employers in the industry—the dealers, service men and manufacturers—as well as to the employed. Quite a number of employers have secured excellent foremen as well as apprentice mechanics, through the assistance of this school. In this field the school is making itself very useful to the automotive world, and is pushing its efforts along strictly business lines, to take advantage of every opportunity to increase its service.

# NOTES OF INDUSTRY AND TRADE

## 1922 AUTOMOBILE SHOW TO BE IN MADISON SQUARE GARDEN.

At the annual meeting of the National Automobile Chamber of Commerce just held it was decided to hold the 1922 automobile show in Madison Square Garden. This indicated the sentiment of the manufacturers regarding improved business conditions in the future, and also put at rest recent rumors that in view of the depressed motor situation and the fact that Grand Central Palace has ceased to be an exhibition building, the directors of the National Chamber might deem it expedient to abandon the 1922 show. No such sentiment, however, appeared at the meeting. The New York national exhibition will be held early in January, and the Chicago national show will follow in the Coliseum about a month later.

Governor W. P. G. Harding of the Federal Reserve system, was a guest at the meeting, which was held at the National Chamber's office, 366 Madison avenue.

"The emergency of 1920 has definitely passed," said Mr. Harding, "and the banks in the Federal Reserve system are now in a better position to extend to all legitimate business the assistance actually needed than has been the case for a long time."

Statements were presented showing that automobile shipments during May represented 7 per cent. of the volume of May one year ago. The recent reductions in prices by manufacturers were regarded as a natural condition of business readjustment, and it was the general opinion that the present levels would remain unchanged for many months.

Colonel Charles Clifton of Buffalo was re-elected president, Roy D. Chapin, C. C. Hanch and Windsor T. White were elected vice presidents, A. J. Brosseau secretary and H. H. Rice treasurer. The following new directors were elected: A. J. Brosseau, A. R. Erskine, Alvan Macauley, W. E. Metzger and R. E. Olds.

## KINGSLEY BRANCH MANAGER OF AMERICAN MOTORS CORP.

Announcement has also been made by the American Motors Corporation of the appointment of D. M. Kingsley as manager of the New York branch, which is located at 229 West 57th street, just off Broadway. Mr. Kingsley is well known in the automobile industry, having been associated for a long period with the Locomobile company and more recently as vice president and sales manager of the Holmes car.

## DOTY HAS CHARGE OF PREMIER SALES.

H. E. Doty, formerly vice president and sales manager of the Haynes Motor Car Co. of Chicago, has assumed the direction of sales and advertising of the Premier Motor Corporation, Indianapolis, Ind. He has been identified with the automobile and allied industries for more than a quarter of a century.

## Sterling-Knight Motor Co. Organized

The Sterling-Knight Motor Co., an Ohio corporation, has been organized to build in Cleveland a new Knight six-cylinder motor car. It will be known as the Sterling-Knight and will be a powerful and highly developed Knight motored car and one of the best built in America.

The Sterling-Knight syndicate was formed more than a year ago to finance the development of this car under the direction of J. G. Sterling, formerly chief engineer of the F. B. Stearns Co., and an experienced mechanical force which he brought with him.

While but little information has been available, it was known in Cleveland automotive circles that an exceptionally strong organization was behind this project. A small, well equipped machine shop had been secured, a five-acre factory site adjacent to the Jordan plant had been purchased and three cars were built.

A preliminary exhibit of these cars was made at the Cleveland automobile show the last week in January, and at the Importers' Salon in Chicago during February. The cars have had an unusual, thorough test, both on the dynamometer and on the road, and are now ready for production.

Deciding to start building the cars as soon as possible, the syndicate members on April 18th turned over their interests to the new company.

The Sterling-Knight Motor Co. is chartered under the laws of the State of Ohio, with an authorized capital stock of \$1,000,000 preferred stock, 20,000 shares of no par value common stock, 2500 of which are known as class A founders' shares, and 17,500 class B common stock.

The directors are: P. H. Withington, Alva Bradley, J. G. Sterling, W. B. Gong-

wer, J. V. Thomas, C. O. Mininger, R. D. Jacobs, R. H. York and A. M. Snyder. Officers: President and treasurer, P. H. Withington; vice president in charge of engineering and production, J. G. Sterling; vice president and manager of sales, J. V. Thomas; secretary, A. M. Snyder.

These men and the other members of the original syndicate are very well known in the trade and have been identified with leading industries in financial and executive capacities for years; their connection with this company should give it a strong position in the industry.

It is obvious that the present organization plan is a temporary one, and suited for an initial limited production only. The company will start building cars in very small quantities, increasing in number as fast as careful and sure methods and facilities are worked out.

There is no intention of building a factory on the company's property at the present time, except possibly a small assembling unit. Facilities for building these cars are being secured by acquiring a completely equipped and operating machine shop here in Cleveland, the present trade conditions having brought about a number of attractive opportunities of securing more or less temporary manufacturing facilities in this way.

## GIBSON'S NEW GLARELESS LENS.

The constantly increasing number of automobile accidents, causing an alarming death rate, is stated to be due largely to the use of inefficient headlights. Any lighting system that concentrates the beams, shafts or glare rays is dangerous not only to the car driver, but to everyone he meets.

The Gibson lens has been developed during the past year by the Gibson Lens Corporation, Cleveland, O., to supply a device fully efficient in every particular, and is claimed to have been indorsed by officials at the head of state and city departments throughout the country.

The Gibson lens eliminates the glare without reducing or concentrating the light. The visor, being lower in the center, controls all upward rays directly in front of the machine, keeping the projection of light out of the eyes of pedestrians, as well as of drivers of approaching vehicles. The light is projected at right angles from the car front, lighting up the full width of the street on both sides and carrying forward several hundred feet in advance of the car.

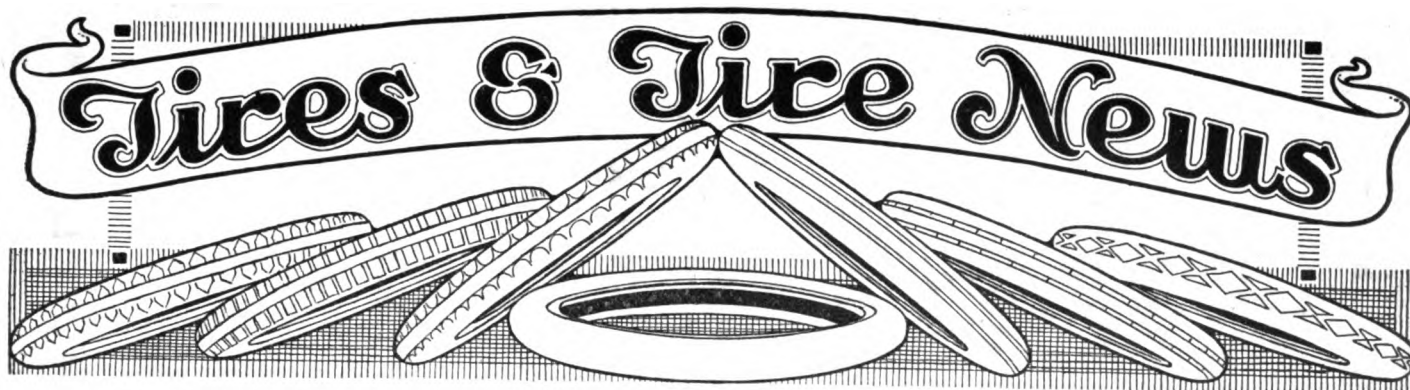
There is no tilting up or down, no complicated adjustments, no dimming—just a full driving light without glare. No dimmers, frosted globes or spot lights are necessary with the Gibson lens.

The Gibson lens is made in sizes for use on the lamps of all the well known makes of cars. Orders may be sent to general state distributors or direct to the Gibson Lens Corporation, Cleveland, O. The diameter of the headlight should be sent with order.



H. E. Doty, Director of Sales and Advertising of Premier Motor Corporation.





## Lower Tire Prices Cut Living Cost

"They may talk about the high cost of living all they want to," said a garage owner who has been many years in the business. "The automotive industry right straight through shows that vehicles, tires and accessories have very nearly reached a new low level, and this is especially true of the tire end of the business according to my figures." and I found on reading what he had been working on that what he said was right.

Tires are lower than they were in 1913, dollar for dollar, and considering the mileage, are really lower than at any time during their history.

The "low level" so often referred to was in 1915, when a series of price cuts of competitive nature lowered selling costs in a marked manner, but even that level was only 20 per cent. under the present Goodrich price that has obtained since the last cut.

No discussion of tire prices is complete unless comparative values are considered. The real question that should be asked is "what mileage do I get for my money?" and not, "what do I pay for the tire?" With this in mind it will be easy enough to establish that tire prices today are lower than they were in 1915, for the reason that there is hardly a tire on the market today that does not give better service and greater mileage than those manufactured in any previous year. Since 1915 great work has been done in building better and more serviceable tires. This is in a measure accounted for by the fact that tires are made over-size and materials are more uniform, all of which, combined with better manufacturing methods, has resulted in greatly improved tire service.

It is only during the last few years that specially woven long staple cotton has been procurable in place of the square woven fabric of mediocre quality that was formerly used in tire building. Methods of compounding rubber have also been worked out that assure a better product, all of which has resulted in a better adjustment basis on the part of manufacturers, which in itself is material proof of the better product now being made.

It is a safe hazard to say that tires today give more than 50 per cent. better service than in 1915, and if tire companies were selling tires on a mileage



E. G. Wilmer, President of Reorganized Goodyear Company.

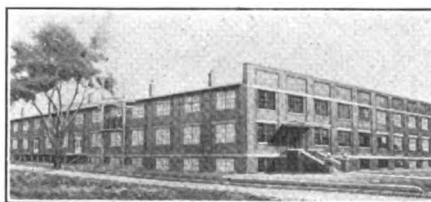
basis the price charged would be from \$5 to \$25 higher than during that period.

The original reduction made the first of May by the B. F. Goodrich and Pennsylvania companies was somewhat startling on account of the amount, 20 per cent. Somewhat of a reduction all along the line was not unexpected, but it was generally believed that the amount of the reduction would not be so large at this time.

The Goodyear Tire and Rubber Co. reduced prices from 11½ to 15.8 per cent. on casings and as high as 20 per cent. on tubes.

The Miller Rubber Co. also has announced reductions of 20 per cent., while the Firestone Tire and Rubber Co. has announced slightly lower reductions.

Still other manufacturers reducing prices are the United States Rubber, Ajax, Diamond, Empire, Fisk, Kelly-



Plant of Climax Rubber Co., Delaware, O.

Springfield, Lee, Mason, Globe, Miller and Racine.

Prices of cord tires are cut an average of 12½ per cent. under the new schedules and fabric tire prices are cut 17½ per cent. Tube prices are reduced 20 per cent.

Under the new prices a 30x3 fabric tire, now \$17.25, will cost \$14, and a 30x3½ fabric tire will be reduced from \$20 to \$16.50, while a 30x3½ cord tire will be reduced from \$32 to \$24.75.

## BIG AKRON FACTORY CLAIMS NEW RECORD.

Building 12 tires a minute of one size is a record set by a big Akron tire plant.

This factory is Plant No. 2 of the Firestone Tire & Rubber Co. It makes only 3½-inch tires. The huge building is located near the southern confines of the city and is able to produce 16,020 casings and 20,022 tubes in a single day.

Such vast production is only made possible, of course, by the use of the most modern and extraordinary machinery. The precision and ingeniousness of the great Firestone tire building machines completely outdo the hand building methods, say Firestone officials.

According to officers of the company it is by reason of these marvelously advanced tire building methods, the insistence upon quality materials, and the efforts of a loyal organization, every man and woman a stockholder, that the Firestone company was recently able to announce the new price of \$13.95 for its 3½-inch non-skid tire.

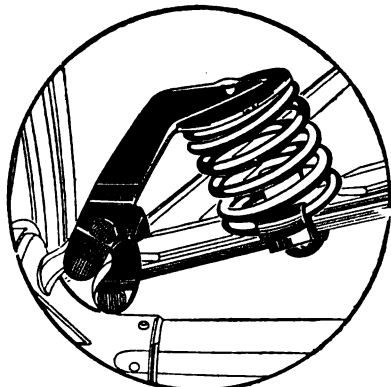
## WILMER MADE PRESIDENT OF GOODYEAR.

E. G. Wilmer, former vice president of the Steel and Tube Co. of America, one of Milwaukee's largest industries, has been made president of the newly organized Goodyear Tire and Rubber Co. of Akron, O. Although he has never practiced law, he holds a degree from George Washington University, Washington, D. C. He is 38 years old and has had an extensive experience in the organization of mining, steel and chemical projects, in the management of which he has shown unusual ability for the 12 years with which he has been identified with the work. He is said to be the youngest president of any of the larger tire companies in the world.

# ACCESSORIES DEPARTMENT

**The New Glidewell Shock Absorber** for Ford cars is stated to be worked out along the scientific laws of compound leverage and to have gained wide favor among Ford drivers because of its ability to absorb road vibrations.

As will be noticed in the illustration, the regular Ford construction is not changed, nor is it necessary to take off the Ford wheels with the Glidewell. The normal body weight does not compress the coil springs, thus allowing full range of action for the coil spring when



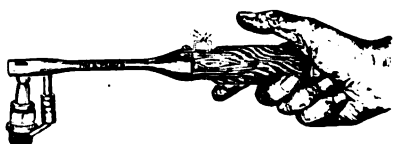
the passenger load is added. Neither does the Glidewell nullify the action of the regular Ford transverse springs, as by the principle of compound leverage employed the coil spring absorbs the small constant road vibrations which are not absorbed by the Ford springs.

The Glidewell also, by its patented construction, stops extreme upthrow and prevents tipping or sideways in enclosed models.

Manufactured by the Glidewell Manufacturing Co., Richmond, Ind. Prices on request.

**The Magic Wand Spark Plug Tester** was invented by a trained ignition and battery expert of 20 years' experience and is considered of special value to ignition and battery service stations, garages, car sales rooms, automobile factories and to car owners who are mechanically inclined.

It is claimed that the Magic Wand will instantly reveal a spark plug that misses



fire from any cause. It is also so arranged that the intensity of the spark in all the plugs may be quickly and accurately measured; so that they may be all so set that they will fire uniformly. This is done by bringing out the spark at a gap which can be adjusted by a concealed insulated attachment. The spark is drawn out six inches from the plug, thus

preventing erosion of the plug terminal by electrolysis. It can also be used to test the ignition circuit wires.

The instrument is recommended for any internal combustion engine and the claim is made that it will save many times its cost every season in saved spark plugs and fuel, and increased motor efficiency. Drivers can use it to quickly locate trouble on the road.

The instrument is made of the best materials, and has no parts requiring replacing. Patents are applied for.

Manufactured by the Magic Manufacturing Co., 538 South Dearborn Street, Chicago, Ill. Price, \$2.50 each.

**Hastings Glass Rear Curtain Lights** for Ford cars add to the stylish appearance of the car and will outwear celluloid several times. They are easily kept clean, enabling the driver to have a clear view at all times. They are guaranteed not to sag or tear the curtain.

They may be installed by the car driver in a few minutes, the only tools necessary

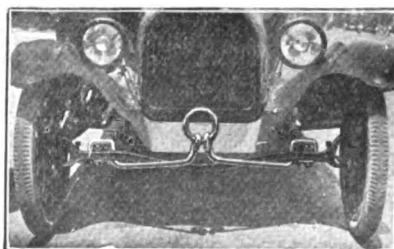


being a screw driver and a 10-penny nail.

This is a good proposition for the dealer, as it makes an attractive shelf package and there are no come-backs or adjustments. They are packed in a package containing a set of three.

Manufactured by the Hastings Manufacturing Co., Hastings, Mich. List price, per set of three, \$2.50; west of the Rockies, \$2.75; in Canada, \$3.50.

**Stewart Car Lifter Hooks** are designed for the Model 490 Chevrolet and other cars. In use these hooks are placed underneath the front axle and over the

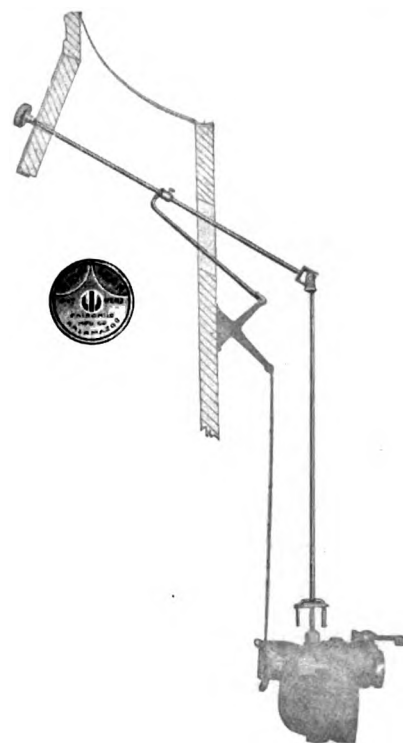


spring, and the rings are put on the hoisting hook. The car can then be lifted with ease and safety.

A special short car support in the center of the axle for front and rear axle work is made by the Stewart Co., the price of which will be given on application.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. Price of car lifter hook, \$15 net.

**The Fairchild Combined Needle Valve Adjustment and Choking Device** for cowl type Ford cars combines the needle valve adjustment and choker in one unit, eliminating reaching from the instrument board to the dash to adjust the carburetor. A marked adjustable dial on the oper-



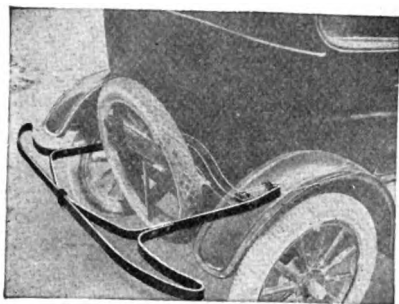
ating knob permits the instantaneous adjustment of the carburetor for easy starting, extreme power or economical running.

One of the main features of this outfit is its ease of installation; it can be attached in two or three minutes as there are no holes to cut. The existing holes in the dash and instrument board are utilized. Full instructions accompany each device.

Manufactured by the Fairchild Manufacturing Co., 308 West Kalamazoo Avenue, Kalamazoo, Mich. Retail price, \$1.75. Handled through leading jobbers.

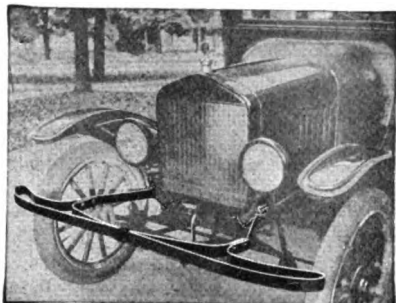
(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The Hastings Bracket Type Side Tire Carrier**, single and double, fastens to the running board and windshield bracket of the car. The tires in the carrier are held rigid at three points. It is adapted to



carry three or 3½-inch tires or rims. It is equipped with the Hastings patented thief-proof locking device, and is finished in high-grade fired black enamel.

The Hastings cradle type tire carriers, side and rear, carry 3 or 3½-inch rims or wheels and are attractive, strong and



durable. This also has the thief proof locking device and is finished in high grade fired black enamel.

The Hastings company also manufactures single and double expansion rear tire carriers for Ford cars, which include the thief proof feature and the heavy duty Ford truck tire carrier.

Made by Hastings Manufacturing Co., Hastings, Mich. Prices on request.

**Never-Slip Auto Running Board Mats** facilitate the removal of dirt and dust from the shoes before passengers enter the car, thus prolonging the life of expensive floor coverings and providing the advantage of a comfortable and safe place to step on when entering and leaving the car.

Never-Slip running board mats are made from selected Coir yarn imported from southern India. This material is practically indestructible and is particularly efficacious in thoroughly cleaning the shoes.

The mat is securely held to the running board by spring clips, which at the same



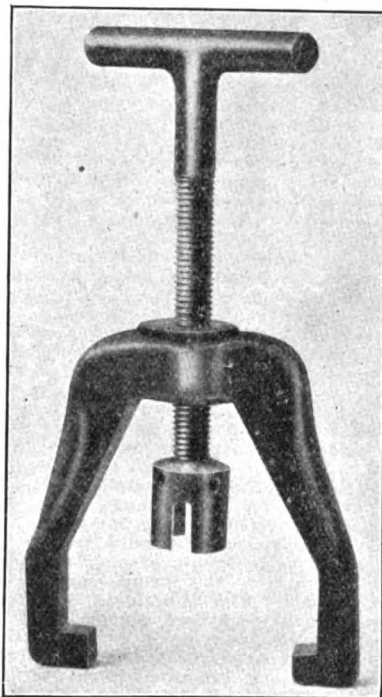
time permit easy removal for cleaning when necessary.

To attach the Never-Slip mat to the metal running board of the car, insert wooden strips under the springs on the bottom side of the running board.

The genuine Never-Slip mat always has the Never-Slip trade mark.

Manufactured by the Mat Co., Muskegon, Mich. Packed three dozen to a case. Dealer's proposition and literature on application.

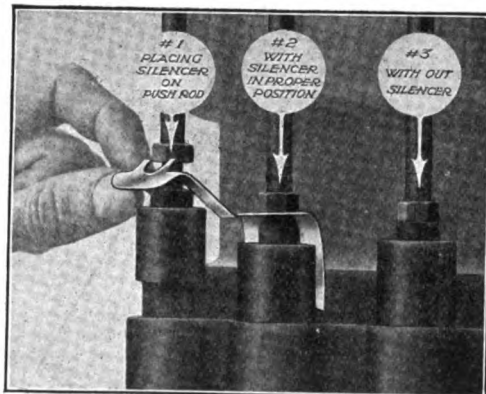
**The Stewart F-B Clutch Puller**, although designed for Chevrolet F-B models, also fits the Chevrolet one-ton truck, the Oldsmobile one-ton truck and the Samson 1½-ton truck. It is stated that the time and trouble saved on the first job will pay for this device, and once



used it is found to be hard to get along without it. The simplicity of the construction is shown in the cut.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. Price, \$7.50 net.

**The Stewart Valve Tappet Silencer** is especially designed for Chevrolet motors. All clicking, rattling and noisy action of the valve tappets and push rods are claimed to be absolutely stopped by the Stewart Silencer. This noise is due to the tappet lock jumping up and down in the slots of the valve lifter and valve lifter nut. The silencer bears on the upper edge of the lock and holds it down, preventing the annoying rattle. This silencer is stated to be always well lubricated and it is claimed that its use saves the ex-

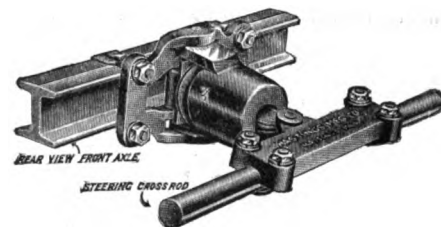


pense of replacing valve tappet locks. It keeps the valve lifter from turning on the cam and prevents side slap. It is easily attached. When installing the silencers be sure to adjust the push rods.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. Price, per set of eight, \$2.

**The Hastings Stabilizer** is designed for use on Ford cars and is stated to make these small models drive like a large car

equipped with worm and sector steering gear. It eliminates the continuous nerve-straining grip on the steering wheel and gives easy and sure control of the car at all times. It is claimed to always bring



the front wheels back to a straightaway and to save wear and tear on tires, thus adding greatly to their mileage.

The Hastings Stabilizer is sold with a money-back guarantee of satisfaction.

Manufactured by the Hastings Manufacturing Co., Hastings, Mich. List price, \$6; \$6.25 west of the Rockies; in Canada, \$9. Packed one in a box.

**The Stewart Motor Block Stand** for Chevrolet 490 and F-B models is the same as the bench rack except that it is designed to stand on the floor. With it the motor can be worked on in any desired



position with ease and convenience. It does away with the old fashioned wooden horse equipment and is constructed for the heaviest usage.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. Price, \$40 net.

**The New Kales "Hindview" Model** is stated to be a notable improvement in the construction of oblong mirrors for the inside of closed cars. This is a new addition to the line of round mirrors produced by the Kales company.

This mirror retains the Kales "Hindview" ball joint, which enables the driver to tilt the mirror to the desired adjustment immediately, without leaving his seat. This feature is most desirable



when two or more people drive the same car, as the adjustment varies for drivers of different stature.

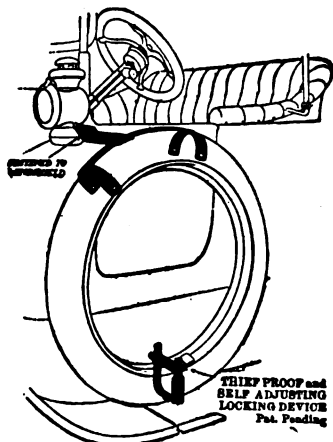
To attach the mirror it is necessary to remove only one bolt in the bracket, or arm, and insert three wood screws—the heads of which are concealed. As the mirror need not be detached from the holder, scratching of the silvering is eliminated.

This new Kales product is made of French plate glass, with rounded edges; length, nine inches.

Manufactured by the Kales Stamping Co., 1657-1687 West Lafayette boulevard, Detroit, Mich. List price, \$3.50.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

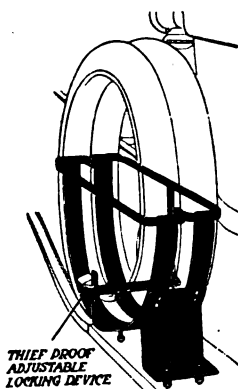
**Hastings Ford Spring Bumpers** are of a new type of construction which is stated to make them stronger yet lighter in weight. They are designed to give Ford cars the streamline effect of large cars. They have more resisting power and are so constructed that it is impossible for them to vibrate loose or rattle. They are



sold with a money back guarantee of satisfaction; damaged parts or the entire bumper will be replaced free of charge when returned to factory regardless of cause of damage.

The front bumper is attached flush to the end of the frame, each fitting being held in place by two U-bolts. The bars and arm are 5/16 by 1 1/4 inch. The material is 100-point carbon spring steel.

The Ford rear bumper is of the same type, material and construction as the front member. It is attached to the frame and cross member of the car on each side.



The arms and bars of the Hastings bumpers are interchangeable front and rear. They are packed in individual wooden crates.

Manufactured by the Hastings Manufacturing Co., Hastings, Mich. List prices: Front and rear, all black finish, \$12; all nickel, \$14. West of Rockies, black, \$12.50; nickel, \$14.50. In Canada, black, \$18; nickel, \$20.

The **Hole Shooter** is one of the late products of the A. H. Peterson Manufacturing Co., expert tool maker, a small, portable electric drill weighing only 3 1/2 pounds. This reduced weight is made possible by an improved design and the skillful use of aluminum, of which the entire case and handle are constructed. But neither power, speed nor durability have been sacrificed in this accurately balanced drill.

Awkward drilling jobs are easy when workmen have the handy, compact 3 1/2-pound Hole Shooter. Because of the exceptionally light weight, the operator does not tire as readily as with a seven to 10-pound drill, and both accuracy and output are increased. The Hole Shooter also is stated to effect a big saving in drill points.

This handy drill, with its capacity of 3/16 inch in steel and 1/4 inch in wood,

## THE HOLE SHOOTER



lends itself to a multitude of uses for garagemen, trimmers and body builders. It saves time and work in drilling small holes for installing clocks, speedometers and cigar lighters on instrument boards; for attaching robe rails or sun visors; and for equipping enclosed cars with mirrors and spot lights. Trimmers and body builders find the Hole Shooter "made to order" for fastening upholstery moulding, for installing flower vases and vanity cases in limousines and sedans, and for attaching curtains, hinges and locks.

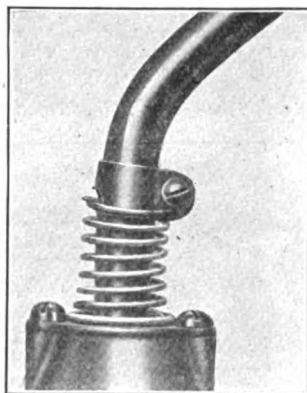
The Hole Shooter has a universal motor, operating on either direct or alternating current. It develops a speed of 1600 revolutions per minute; it is furnished with either 110 or 220-volt windings. A centrifugal fan keeps the motor cool, even under the severest working conditions.

The Hole Shooter is a standardized tool, all parts being interchangeable. The gears are cut from nickel alloy steel, heat treated by a special Peterson process. A high grade ball bearing of surplus thrust capacity carries the front end of the spindle shaft. The spindle is offset for close work in awkward places.

A Cutler-Hammer push button switch, located in the upper part of the revolver-like grip, gives instant control of the current. The Hole Shooter is regularly equipped with a Jacob's chuck, and is furnished with a 10-foot cord and plug.

Manufactured by the A. H. Peterson Manufacturing Co., 1614 Frattet Street, Milwaukee, Wis. Literature and prices on request.

The **Stewart Anti-Rattler** is designed for the gear shift lever on Chevrolet Model 490 cars. It only takes a minute to attach this device. The knob on top of the gear shift lever is unscrewed and the spring and clamp are slipped down to the bottom. The spring should be com-



pressed about an inch and the clamp tightened. The clamp bolt should be put towards the seat.

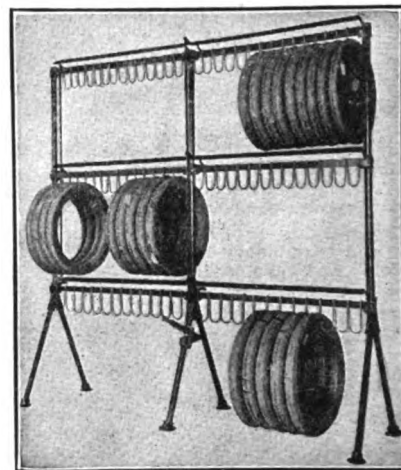
The Stewart Anti-Rattler is guaranteed to top the noisy rattle of the gear shift lever.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. List price, 75 cents.

The **Perfection Tire Locking and Display Rack** is claimed by the manufacturer to be one of the few pieces of equipment that the tire dealer cannot afford to be without; that it is a store fixture—just as necessary as a cash register. The progressive dealer owes it to himself and his business to protect his stock of tires, as well as to display them in a neat, orderly, space saving manner.

With the Perfection equipment each tire is displayed individually and is held in place by a patented hanger. A master locking arm simultaneously locks every tire in the rack, positively protecting against theft.

The Perfection hanger or hook by which the tire is held is made of hard rolled steel and keeps each tire securely in place; there is no toppling over. In racking up the tires the hook is simply slipped over the casing and adjusted to clasp the side walls. The entire weight of the tire rests on the hard bead.



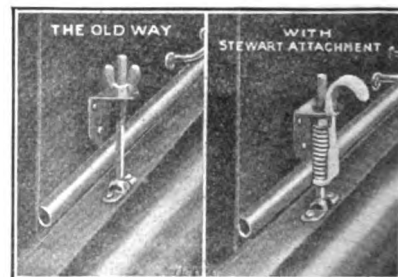
When the lever arm, which is attached to the left front standard of the rack, is dropped and the key turned in the Corbin lock, all tires are safe against theft.

The Perfection rack is carried in a number of convenient stock sizes, but the manufacturer is prepared to make to order any desired size to meet individual requirements.

Manufactured by the Perfection Garage Equipment Co., Hagerstown, Md. Literature and prices on request.

The **Stewart Spring Hood Clamp**, especially designed for Chevrolet 490 models, is shown in the cut. It is very simple in its method of attachment, as there are no holes to drill, and the same bolt and hood brackets are used as are now on the car. The wing nut of the clamp is taken off and bolt put through the hole in the hood clamp. The spring is next slipped on and then the nut. The nut is turned down to increase the tension on spring. The nut should not strike the under side of the hood bracket.

It is claimed for Stewart hood clamps that they keep the hood from rattling, do not bend the hood brackets or tear the swing bolt loose. At the same time the hood is allowed to work freely with the twisting of the body.



The Stewart company also is marketing a special Chevrolet F-B Baby Grand spring hood clamp attachment, which, being nickel plated and polished, is a very classy looking fitting.

Manufactured by the Stewart Manufacturing Co., Inc., Oakland, Cal. Price of spring hood clamps, per set of four, \$1.50; spring hood clamp attachment, per set of four, \$2.75.

(When Writing to Advertisers, Please Mention the Automobile Journal.)





Above: Tank wagon spraying "Tarvia-X" under steam pressure with special Barrett nozzle.

At Left: Brighton Plant, Rochester, N. Y., with loading lines for tank cars and motor trucks. At right: Tarvia Service Station at Syracuse, N. Y., completely equipped to ship in tank cars, motor trucks or barrel lots.

## Service!

CALL on our Special Service Department regarding your road problems or the conditions in your vicinity. We gladly put the skill and experience of our engineers at your disposal. This service is free, for the asking. If you are interested in *better roads* and *lower taxes*, here is an organization that can be of real service to you.

### Tarvia—When you want it

In road work, building or repair, nothing is more important than having material on hand *when* it is wanted. Delays and hold-ups on delivery are expensive. Tarvia Service can be depended upon. Tarvia Service is always "on the job."

### Tarvia—Where you want it

Back of Tarvia Service stands the great Barrett organization with its branches, placed all over the U. S. These branches are strategically located to afford efficient centers of distribution. You can always get Tarvia *where* you want it.

### Tarvia—How you want it

Tarvia can be delivered by tank car, motor truck, tank wagon or in barrels. As a rule, Tarvia motor truck service is available within 40 miles of any Barrett Service Station or plant. When the size of the job warrants, motor trucks may be furnished at any distance from the plant or service station, the trucks operating from tank cars placed on sidings.

Motor truck distribution is faster and well worth the slight increase in price necessary to cover the use of the trucks, but equally good results may be obtained with the tank wagon—Barrett nozzle method—as shown in small illustration above.

Simply specify *how* you want Tarvia delivered—we'll do the rest.

TARVIA is a coal tar preparation made in a number of grades to meet varying road conditions. It is the most popular road material in America and has solved the problem of low cost, traffic-proof roads and pavements for hundreds of towns throughout the country.

Booklets free on request.

# Tarvia

*Preserves Roads—Prevents Dust*

THE BARRETT COMPANY, Limited.

New York  
Detroit  
Salt Lake City  
Johnstown  
Elizabeth

Chicago  
New Orleans  
Seattle  
Lebanon,  
Buffalo  
Montreal

Philadelphia  
Birmingham  
Peoria  
Youngstown  
Baltimore  
Toronto

Boston  
Kansas City  
Atlanta  
Toledo  
Omaha

The Barrett Company

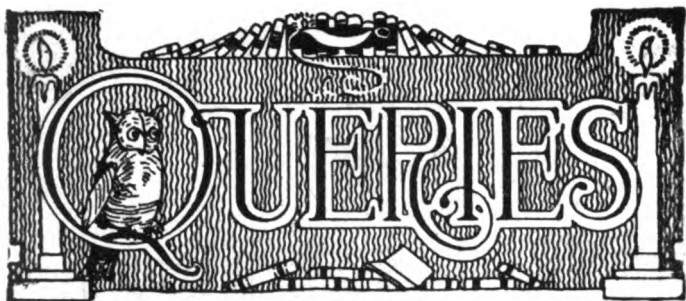
St. Louis  
Minneapolis  
Duluth  
Richmond  
Jacksonville

Cleveland  
Dallas  
Milwaukee  
Bangor  
Houston  
Halifax, N. S.

Cincinnati  
Nashville  
Bangor  
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Denver

Pittsburgh  
Syracuse  
Washington  
Bethlehem

(When Writing to Advertisers, Please Mention the Automobile Journal.)



### FORD CYLINDERS OUT-OF-ROUND.

(C. B., Milladore, Wis.)

Kindly tell me through the query columns of the Automobile Journal what is the trouble with my 1917 Ford car. The spark plug on number one cylinder has to be cleaned about every 10 miles and the plug of number two cylinder about every 20 miles. Have recently overhauled this car and this trouble did not occur before overhauling. There is weak compression in one cylinder.

I put a new pinion in the drive shaft and now there is a growling noise in the rear system. What causes this?

Oil leaks out around the packings. Is there any way to prevent this without using packing?

Where can I obtain automobile road maps of the State of Wisconsin, giving number and name of highways?

We advise that you take your car to a service station if possible and have oversize Ford pistons fitted to the cylinders, at the same time fitting new rings. The pistons should be slightly oversize to allow the rings to wear off the uneven metal of the cylinder walls while the engine is running. We have known several instances where this has been done and the results were more than satisfactory to the owners.

The reason for the plugs fouling is that cylinders number one and two are slightly out of round, due to the abrasive action of dust, which enters through the breather, passing down into the oil and being carried up into the cylinder walls by the centrifugal action of the pistons in rotating with the crankshaft. This oil and dust inevitably cut or wear the walls of the cylinders and the piston rings in a short time, making

the walls slightly out-of-round. Fitting new oversize pistons and rings, using the engine as usual with an over-supply of oil will soon remedy this trouble.

Oversize pistons and new rings should be fitted to all of the cylinders at one time so as not to throw the pistons out-of-balance.

The growling noise which you hear in the differential housing is probably caused by the pinion meshing too deeply with the large bevel ring. Probably you replaced the brass washers at each side of the bevel ring with new, although you do not say that you did. This would force the gears too deeply into mesh at first, but it would soon wear away. Possibly you did not supply sufficient lubrication when assembling the axle and housing. If not additional lubrication may be supplied through the plug opening in the rear of the housing. No special adjustment is provided in the Ford for separating the gear teeth and about the only method that can be used is to fit both bevel ring gear and pinion gears new, using gears from the Ford Motor company, which are accurate in fit.

Running an old and new gear in mesh may cause the growling sound that you mention, but by fitting both gears new, the trouble may be prevented.

You speak of the oil leaking out around the packings, but do not mention the location where the oil leaks occur. I take it that you have reference to oil leaking out around the brake drums of the rear wheels. Fitting thick felt washers under the dust cap should remedy the trouble. Oil is pumped out from the differential housing by the pump action of the axle shaft and the differential gear housing. This oil is forced in back of the housing and follows the axle through to the wheels, the felt washers preventing its going further.

We have shown in the accessory columns of the Automobile Journal from time to time devices that could be placed in the axle housing around the axle shaft that was claimed to prevent the passage of the oil; by referring to back issues you can probably locate just the device that you wish.

You can obtain automobile road maps of the State of Wisconsin either from the Automobile Blue Book Publishing Co., 243-249 West 39th street, New York city, or Walker Lithographic & Publishing Co., 400 Newbury street, Boston, Mass. The national touring department of the B. F. Goodrich Co., Akron, O., has issued a set of maps of all the states.

# TRADE OUTLET

## AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK, STEVENS-DURYEA, KNOX, OVERLAND, ETC.

Motors,	\$25.00 up	Presto Tanks,	\$4.50 up
Magnetos,	4.00 up	New Spotlights,	2.00 up
Carburetors,	8.00 up	Generators,	10.00 up
Rear Axles,	15.00 up	Gears,	1.00 up
Front Axles,	5.00 up	Bearings,	1.00 up
Cylinders,	5.00 up	Radiators,	10.00 up

\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

## BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

## Auto Mailing Lists

Send for our free complete Price List covering Auto Dealers, Owners, Ford Dealers, Truck Dealers and Owners, Garages, Auto Mfrs. and etc., any state.  
A. F. WILLIAMS, Mgr. of List Dept.  
168 W. Adams St., Chicago, Franklin 1182.

CLASSIFIED ADVERTISING PAYS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

## COTTON WASTE, WIPING RAGS, CHRESEECLOTH.

Adapted for automobile use, in 1/2 lb. and 1 lb. cotton bags and paper cartons. SOFT, CLEAN, WHITE COTTON WASTE.

Assorted wiping rags—New, clean sanitary. Sample on request.

STANDARD WASTE & RAG CO.  
558 W. 51st St. N. Y. C.

## AUTO PARTS.

50% to 90% OFF List.

24 Hour Service. Unlimited Stock.  
Pope-Hartford, Columbia, Reo, Overland and 200 other makes.

Motors,	\$20.00 up	E. Presto Tanks,	\$4.00
Magnetos,	\$3.50 up	B. Presto Tanks,	\$4.75
Cylinders,	\$3.00 up	Bearings,	50c up
Springs,	\$1.00 up	Rims,	\$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,  
Write Us—We Have It.

## Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

**RARE OPPORTUNITY**—"To the man or firm that can qualify. Ohio manufacturing corporation offers exclusive State Selling Rights on patented product of unusual merit. Retail at 60c and \$1. Every motorist, garage, auto accessory store, tire shop, machine shop, manufacturing plant and housewife absolutely sold on one little demonstration. Average car and truck owner will use \$12 worth per year and it should save him \$50 in repair bills. Money-making possibilities unlimited. For full particulars address the National Automotive Products Co., Desk A, 1907 Euclid Ave., Cleveland, O."

**TOBACCO**, natural leaf, homespun, aged in bulk, best chewing or smoking; 8 lbs., \$4.25; 12 lbs., \$6.50, postpaid. Special prices on larger quantities. Address **TOBACCO GROWERS UNION**, Paris, Tenn., Box 306. Reference any bank here.

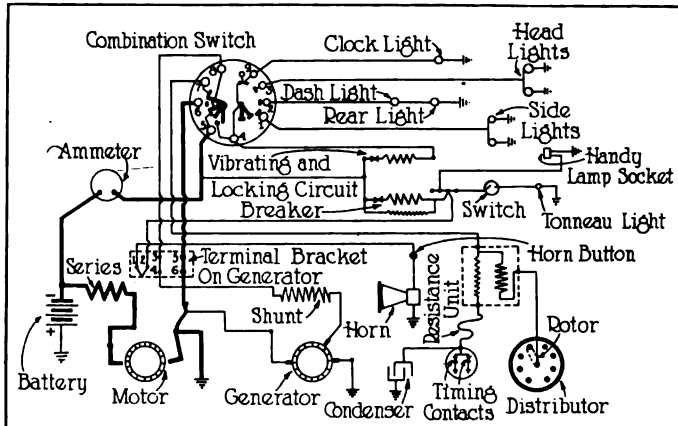
**OIL COOLER for FORDS** saves 50% to 75% oil by actual test; keeps engine cool and clean; increases power. Bolts under crank case in place of present inspection plate. Every Ford owner appreciates it. Quick seller. \$5.00; big agent's profit.  
**Adamson Mfg. Co. East Palestine, O.**

## 1918 CADILLAC WIRING DIAGRAM.

(J. E., Providence, R. I.)

**Kindly publish in the columns of the Automobile Journal a wiring diagram of the Model 57 Cadillac eight-cylinder 1918 car.**

The Cadillac Model 57 was placed on the market Dec. 14, 1917, continued through the years 1918 and 1919. The car numbers running from 57-AI-1000 to 57-TT-146.



You do not state the number of your car, so we are unable to tell whether you have an early 1918 car or a 1918 in the model 57. If the car should happen to be a Model 55, it was shipped from the factory previous to Dec. 14, 1917, and the serial numbers would run from 55-A1 to 55-S2.

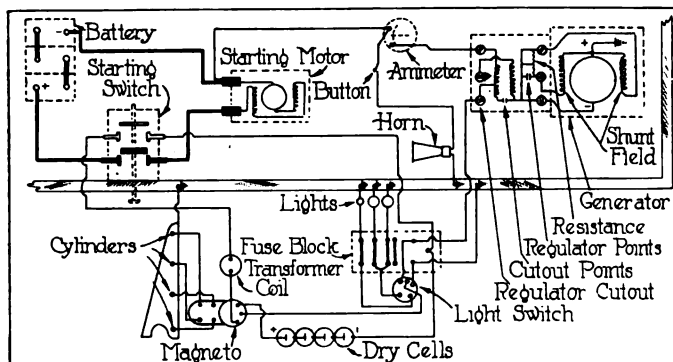
**ENGINE WILL NOT START.**

(W. C. B., Lynn, Mass.)

Kindly tell me through the columns of the Automobile Journal why my engine in my 1915 Maxwell car will not start. Have just installed a new storage battery and new Marvel carburetor. The starter turns the engine over very slowly; still I am sure that the battery is in good condition and that the battery is not the cause of the slow starting.

How can I restore my dimmers to use again? At present they do not function properly. Repairers tell me that dry cells are needed in this car to supply the starting ignition, while others say that the magneto should be able to supply this current without the batteries. Which is correct?

Several causes may be assigned for the slow turning of your starting motor, such as a partially discharged storage battery; poor connections in the starting switch; brushes fitting incorrectly in the starting motor against the commutator; dirty commutators; gears not meshing properly with the starter ring gear; roller clutch on starting motor not working properly; lack of oil, etc.



Your battery, if new as you state, should be in a charged condition, unless you have exhausted the charge through attempting to start the engine without charging it from an outside source. Test each cell with a hydrometer and note the readings. If fully charged each cell will read from 1250 to 1300. Below this the battery is exhausted or nearly so and should be recharged. In placing the battery in the battery holder in the car, make sure that the connections are made firm, but not tight enough to strip the threads of the stud

(When Writing to Advertisers, Please Mention the Automobile Journal.)



# WEATHER

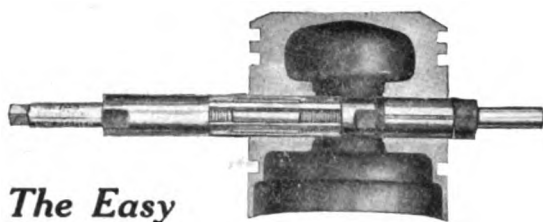
**T**HE knowledge that the Zenith Carburetor automatically adjusts itself to any change in weather, temperature or altitude has always been a source of satisfaction to us.

**It pleases us to realize not only that Zenith users are free from the petty annoyance of constant carburetor adjustment, but also that the uninterrupted service which Zenith gives them is steadily increasing the public good will toward our product.**

## Zenith Carburetor Co.

*New York*      **DETROIT**      *Chicago*  
*Lyons*      *London*      *Turin*





### *The Easy Way to Ream a Wrist Pin Bushing*

It's no easy task to ream a pair of wrist pin bushings to exact size and perfect alignment - unless you use a

### **SUPER-SIX LINE REAMER**

Then it's no trouble at all. The illustration tells why. A tool needed by all repairmen.

*Write for illustrated Price List and Schedule  
of cars to which these Tools are adapted.*

**Cutter & Wood Supply Co.**  
62 PEARL ST., BOSTON 9, MASS.



bolts, and apply vaseline to the terminal wire ends and the socket in which they fit to prevent further trouble from sulphation.

The trouble with your dimming circuit may be traced to either a burned out resistance unit in the back of the lighting switch, a short circuit in the unit, or to loose connections either in the switch or lamps. Examine the fuse in the fuse block controlling this circuit; possibly the fuse is blown. Replacing the fuse or supplying a new unit and tightening the connections should restore the circuit.

A study of the wiring diagram of the 1915 Maxwell which uses the Gray & Davis system of starting and lighting will show the necessity for using dry cells in the ignition circuit, especially for starting the engine. The magneto does not turn over fast enough to generate sufficient current for starting purposes, but if in good condition will supply the current after the engine is running. The magneto is a low-tension machine and develops about the same voltage current as the dry cells and is stepped up to a high-tension voltage by means of the transformer coil shown in the diagram.

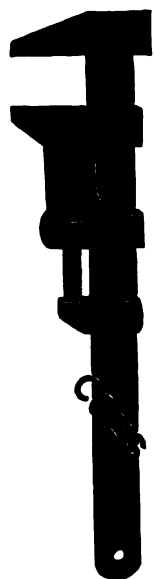
### **TO CORRECT CYLINDERS FOULING.**

(E. P., Port Chester, N. Y.)

I have a 1920 — car which has been run about 1400 miles and two cylinders of the engine seem to carbonize more than the others. Have ground the valves, cleaned the carbon, cleaned the rings and grooves on piston and replaced the rings bright side down and in the same grooves from which they were taken, spacing the rings in the piston as they were originally, and each cylinder seems to have good compression. Would you advise leak-proof rings? If so, should they be of the same size as the bore of the cylinder?

Some of the 1920 — cars came through from the factory with Lynite pistons, which require heat from the engine to fully expand them to the cylinder walls. If you have this type of piston and you wish to continue to use them, procure the next size larger, called an oversize, and split the skirt of the piston with a hack saw as shown in the drawing. The piston should fit the cylinder bore snugly before cutting

## **COES** *The Standard WRENCH*



**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

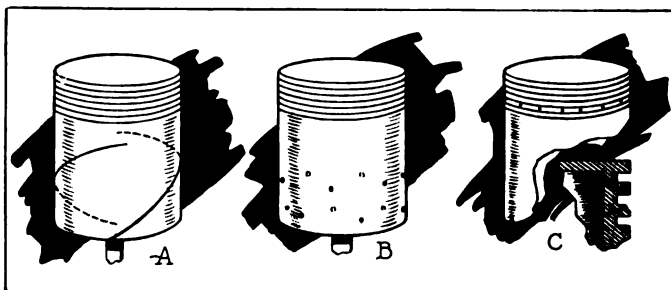
Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench  
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.



the skirt and the cutting is done to allow the piston skirt to contract as the heat of the engine affects it. This will prevent sticking and will allow the piston to work freely when warm, and also prevent the passage of oil by the piston.

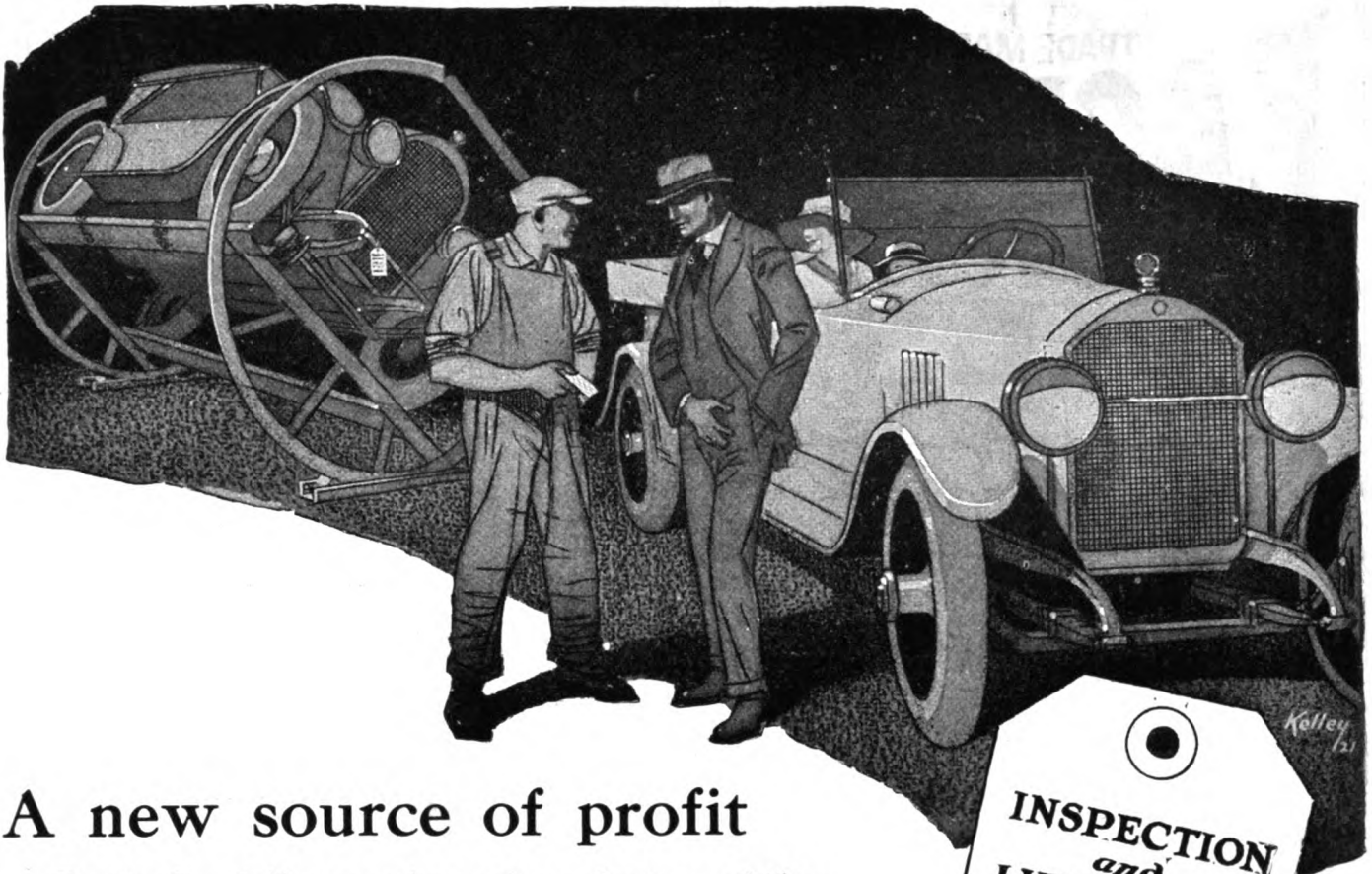
If the pistons are of cast iron the trouble may be remedied by drilling small holes in the piston skirt, as shown in the illustration. Two rows of small holes drilled through the skirt with the holes of one row staggered with the next lower row, seven or eight holes in a row or 14 to 16 holes in the two rows, should be sufficient for the purpose, the object being to drain the excess oil from the cylinder walls back into the engine base.

Still another method to be followed with cast iron pistons is to chamfer the lower edge of the middle ring groove as shown and drill about eight small holes through the bevel into the inside of the piston. Place a scraper or No-Leak-O piston ring in the top groove and the regular rings below will force the excess oil to flow through the drilled holes into the inside of the piston, and prevent it from collecting in the combustion chamber and forming carbon deposits.

Possibly the dippers on the connecting rod ends of the two cylinders in question are a trifle too long and pick up too great a quantity of oil. As this is a difficult matter to adjust we do not advise that you attempt to correct it.

(When Writing to Advertisers, Please Mention the Automobile Journal.)





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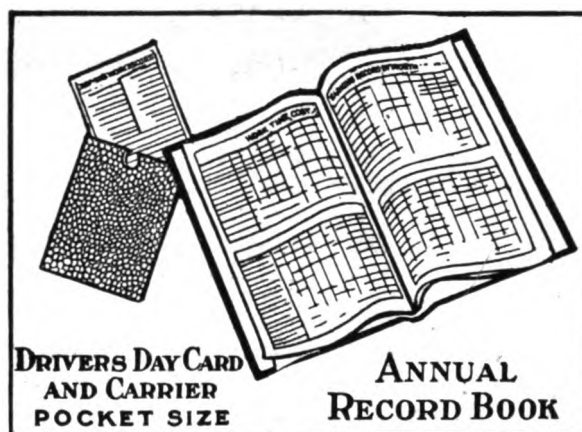
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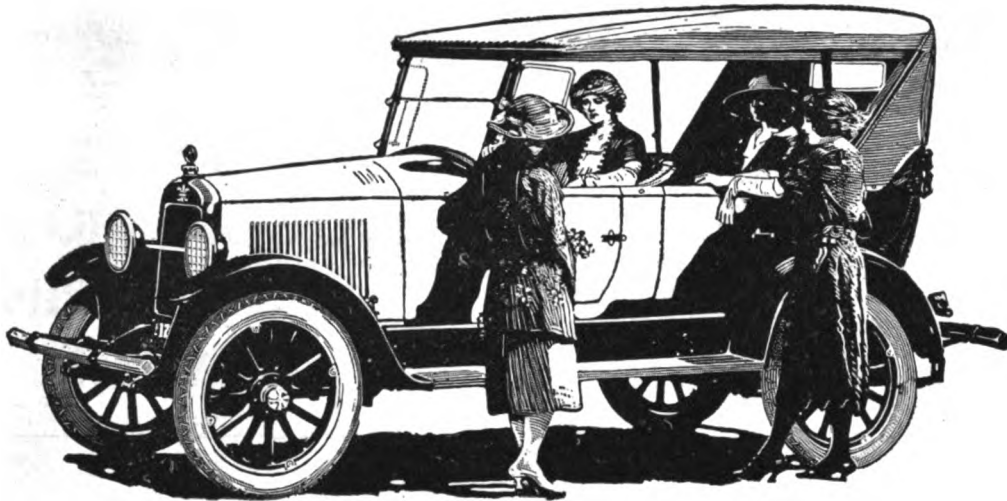
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*Clarence A. Earl* President

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# THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., JULY, 1921.

NO. 12.

## Service—The Industry's Conscience

*Service Man Needs "Politeness of Beaconsfield,  
Mechanical Genius of Edison, Patience of Job,  
Diplomacy of Machiavelli, Force of Roosevelt"*

HERE is a story for service men. Delivered as an address at a recent convention by a man who is a great authority on the subject, it illustrates in a striking manner the fact that service must begin with correct mental attitude toward the car buyer and toward the profit and loss sides of the ledger as well. The true service man realizes his duty toward the world, but he also remembers that he owes a duty to the man who pays his salary as well, and it is only by giving equal consideration to each that he can be called worthy of the name.

True service does not in any sense consist in giving gratuities. Far from it. It consists primarily of constructive, positive thinking along lines that will aid the dealer and the customer to come to a better understanding one with the other. Boiled right down to hard facts, the duty of the service man is to serve the interests of the car owner in such manner as to instill a lasting confidence in the firm he represents. This means that he must be intelligent enough to assimilate the best thoughts offered by modern treatment of the subject, must be honestly ambitious to succeed and must obey the whole 10 commandments of service, the first of which is courtesy.

(By GEORGE M. GRAHAM, Vice President, Pierce-Arrow Motor Car Co.)

In this world of broken pledges, faulty performance and unrealized ideals, virtue must ever stand out resplendent. This is typified by the service man in the automobile industry. Your problems are not of your own making. You inherit and become responsible for the errors of others. You are alike a sacrifice to the failure of materials or to the short comings of men. What others permit to be wrong you make right.

Even Father Time in his courses fights against you, for you must repair the ravages of his blighting hand.

Troubles are your companions. They await you in the morning. They follow you home at night. You dare not quarrel with them. They are the raw material from which you fashion your livelihood.

Your control of your nerves and temper must be absolute. You must smile alike through despair or fury. Credit is often given to Job as the supreme model of patience. You are a super-Job.

No one sees the customer on the same difficult basis that you do. When everybody else has failed, when the product has gone wrong, when the customer has been wrought to the final pitch of fury, then you enter.

To handle him you need the politeness of a Beaconsfield, the mechanical genius of an Edison, the patience of a Job, the

diplomacy of a Machiavelli and the force of a Roosevelt.

I would not say that all your relations with the customer were as those of one man who giveth his coat to another.

The vexed question of bills is in itself enough to prevent entire cordiality. You have to explain away costs for which you are not responsible. You are the apologist for parts prices, yet you do not manufacture the parts. You must make corrections for things that sometimes spring from errors in design. Yet you do not lay out the vehicle. The crimes of production come to your loft to roost.

### Customer Not Always Reasonable.

Nor would I contend that the customer is always fair or reasonable. This is not an ideal world. No one is 100 per cent. good or bad, right or wrong, fair or unfair. You must stand as a buffer between the manufacturer and the user.

That you are daily able to discharge the difficult task is a high tribute to your conscience, courage, knowledge and training.

I have spoken of your relationship with the customer as though all of you men were constantly meeting users and personally dealing with the faults of cars and trucks.

I know that literally this is not true, but in a larger sense the factory service executive by training men for the field

serves the customer just as definitely as if he handled him direct.

The motoring public has come to repose confidence in the kind of service supplied by American manufacturers.

When it is remembered that something like 9,000,000 persons, 95 per cent. of whom are untrained mechanically, are successfully driving rapidly moving cars and trucks through congested cities and over rough transcontinental roads, the miracle of successful operation can be explained only by service support.

Perhaps your greatest source of pride should be the factor you have become in transportation. You are largely responsible for maintaining uninterrupted the function of motor vehicle transit for commodity and for persons.

There is a great thought involved here, for historians and economists agree that no invention, no creation of human genius, means so much to the world as the development of new transportation facilities.

When Robert Fulton launched the Clermont on the Hudson he little dreamed that he had found those new worlds for which Alexander sighed that he might conquer them.

When Stephenson invented the locomotive he guessed not that he had inaugurated an empire of peaceful conquest to make the realm of a Napoleon seem negligible.

Both these inventions came in the first two decades of the last century. It has taken 100 years to develop a new kind of transportation worthy to take place with them. We are the inventors, the exponents and the merchandisers of this new force.

#### High Tribute from President.

Only a month ago our industry received its greatest recognition when in his first message to Congress the President of the United States said:

"The motor car has become an indispensable instrument in our political, social and industrial life."

In the development of this new kind of transportation your part is foremost.

We should talk always in terms of transportation. That we may the better do so, I should like to direct your attention to certain figures that show how great a place we have taken in the transportation fabric of our country.

Commodities move in the United States through four main channels: 15,000 miles of inland waterways, 18,000 miles of interurban electric trolleys, 259,000 miles of steam railways and 2,753,000 miles of highways.

The tonnage carried is still more impressive as proving our case. By trolley freight 4,000,000 tons are distributed yearly. Over the inland waterways go 90,000 tons. The steam railways carry 2,504,000,000 tons, and the motor truck is responsible for the delivery of 1,200,000 tons.

Considering that the motor vehicle is but an infant in the family of transportation, its tonnage is genuinely astonishing. The highway passes more homes than all other avenues of transportation combined. It affords the means by which we may best reach our 105,000,000 of population scattered over 3,000,000 square miles.

The great railroads of the United States are becoming our customers, and this is peculiarly appropriate in view of the fact that we turn over to them yearly \$100,000,000 in freight charges for delivering cars and trucks. Scarcely any first-class railroad in the United States but has come to a recognition of the fundamental fact that no money is to be made from haulage of freight in less-than-carload lots for short distances. There is a growing willingness to divert this unprofitable freight to the motor vehicle.

So equally, another rival, the electric trolley company, is calling upon our help. We are free to concede that we never can rival the trolley in its chosen field, urban transportation. The figures involved are too big.

Every year the trolleys of the United States carry 11,400,000,000 paid passengers and 3,302,000,000 transfer passengers, a total 12 times as great as the passengers carried by the steam railroads of the United States.

#### Are Not Rivals of Trolley.

We are not rivals. We could not take over this burden. We believe that urban transportation must be largely an electric trolley monopoly. But we have discovered and proved that we can supple-

ment the system. We can relieve congestion by operating on streets parallel to those that carry the trolley tracks. We open a means of reaching suburbs without the high capital expenditure for right of way, trackage, power plants and trolley cars. We shall find the electric trolley company a considerable customer in the not distant future.

#### Farmers Another Possibility.

The farmer offers another field of immeasurable possibility. We have already sold him one automobile for one in every two of the 6,300,000 farms in the United States, but we have only sold him 80,000 trucks, or one truck for every 79 farms.

Just as you made long-distance haulage possible, so you have made long-distance touring possible.

#### Utility of Passenger Car.

The utility of the passenger car should never be overlooked. Ninety per cent. of its use is for practical purposes rather than for pleasure. Untold congestion, chaos and discomfort would follow the withdrawal of the passenger car as a medium of individual transportation.

I show you stretching before you a task of great dimensions, but also an opportunity of impressive possibilities.

As to the future of the industry I entertain no doubt. We make and market transportation. The world needs it. Our utility fixes our place.

The great Mike Murphy, trainer of athletes, once said that you cannot lick a football team that will not be licked, and I equally say that you cannot stop a business that will not be stopped. It seems to me that our industry, with its production of 2,200,000 automobiles in 1920, an increase of 267,000 over the preceding year, and with a volume of business in cars, trucks, tires and accessories of \$3,578,000, is a car that cannot be long stalled. In fact, I like to regard it as the car best suited to carry on the American idea.

The great Longfellow, in a noble poem, the *Building of the Ship*, in the words, "Thou, Too, Sail On, O Ship of State," has apostrophized the nation as a vessel. I should prefer rather to picture it as a more modern vehicle of progress, the automobile, but I should want to make sure that in every particular it be an American car.

#### The Ideal American Car.

Since you gentlemen understand specifications, I should like to repeat from a former address what I believe should go into the ideal American car:

Its frame shall be the Declaration of Independence.

Its governor shall be the Constitution of the United States.

Its brakes shall be a solid conservatism that declines to be stamped by clamor.

Its clutch shall be central, but vested in the Congress of the United States as well as in the Chief Executive.

I suggest a long and very wide exhaust so that the vapors of the pessimist and the parlor Bolshevik may be carried far to the rear.

What better lubrication than a broad-minded spirit of toleration that scorns

considerations of wealth, station, caste or creed.

To prevent overheating in the summer and freezing in the winter I should fill the radiator with the milk of human kindness, the best of all solvents.

The ignition of this car shall come from the spark of patriotism inherent in every right American breast.

Its horn shall sound a clarion call for the time when there shall be used in our primary schools and in our public press but one language, and that the language of the Gettysburg address.

The flaming head lamps shall point the danger of the way, and direct us to paths of new glory and new achievement.

I like not to discuss the question of steering, particularly at a time when the nation has had but lately to choose between two distinguished Ohioans. I like not to seem to lean in favor of the worm and sector type of device, but this be my fervent wish: May there never have to do with the steering of the nation's car any "nut."

In conclusion I should like to summon you to a new confidence in your kind of work and its future.

#### Recognition Sure to Grow.

There may come times when you feel that your recognition is not as rapid or as considerable as might be desired. I ask you then to remember that you are a new factor in a new industry, that your importance has but just come into full acknowledgment. Your province and rewards must increase as the industry stabilizes.

But a few years ago you were unknown, now—

You are recognized as the conscience of the industry.

What the light house is to the shipwrecked sailor so are you to the distressed motorist.

You are life insurance to the automobilist and business insurance to the manufacturer.

On the road the service station looms as the Red Cross tent to the wounded soldier.

The time is past when you have to fight to get a hearing from engineering and production departments. The record of faults and failures, once scorned or resented, is now eagerly scanned. Your suggestions are embodied in the product of every manufacturer.

I summon you to believe in your business, believe in yourselves, maintain your standards high, treat justly with the customer, protect your employer, and finally believe that the industry which has failed not to deal liberally with those who have built up its mighty edifice will withhold not proper reward from you who are so vital to its enduring future.

#### TIMKEN-DETROIT NOT TO CLOSE

The Timken-Detroit Axle Co., Detroit, Mich., had planned a month's closing in July when executives would take simultaneous vacations, but uncertainties as to filling customers' requirements by July 1 is causing the plan to be held in abeyance. The company is operating about one-third of normal.

# Prices Apparently Stabilized

Readjustment Has Already Resulted in Greatly Increased Sales—Manufacturers See Little Possibility of Further Changes During 1921—Truck Business Shows Marked Increase Due to Ambitious Road Building Programme.

**P**PRICE readjustment in the automobile industry seems to have been about completed, judging from the final report just issued by the National Automobile Chamber of Commerce, which shows changed prices on the various makes of cars. The new prices in many instances go back to the figures of a few years ago, notwithstanding that the models in many cases are bigger, with better finish and such additional equipment as cord tires and improved electrical apparatus.

In the opinion of students of the industry, the mid-year change has now stabilized the industry to a degree that is bringing increased sales to all companies.

Carload shipments from the factories during April and May were 67 per cent. of the production for the same two months of last year, and there is reason to believe June will be at approximately the same rate.

Compared with the feverish rush for motor cars last year a two-thirds demand looks to be a big falling off, but compared with normal years it shows that the motor car business is faring much better than other lines.

There has been a steady demand for used cars, prices which have also been substantially reduced. Lower prices on new cars have been offset somewhat by the reduced allowances on used cars when offered for a trade-in by the retail buyer. In other words, many who waited for the reductions of the past few

## REVIEWING THE SITUATION.

Price adjustments in the automobile industry are apparently about completed. The mid-year changes have stabilized business and brought increased sales. Present automobile prices offer big values, as the new models in many cases are equipped with cord tires. The production rate is apparently close to two-thirds of last year. Truck sales are on a par with general business and will show marked increase in the near future because of big road-building programmes.

months saved comparatively little owing to the lower valuation on their old cars.

Good buying power has been shown where prices have been reduced or where it was known that present prices and quality would be maintained. The National Automobile Chamber of Commerce figures show that with more than 8,000,000 passenger cars in use, the replacement demand alone should be about 1,000,000 cars. The production of pas-

senger cars last year was 1,883,000. To show how close are the new prices, one of the largest manufacturers in his last cut was only able to reduce \$25. This manufacturer is producing at the rate of 110,000 vehicles a month. During this readjustment period some cars are being sold at a loss because of the high wages and the costly materials that were bought last fall.

While this month may bring a few more changes in cars that have not been reduced this year, it is generally agreed that the mid-year reductions have stabilized conditions in the industry with little possibility of further changes during 1921.

The success of the automobile industry has been based on big production and the resulting low prices which insure a broad market. For that reason every effort has been made to produce better cars at lower prices to insure the big productions which make increased values possible. Moreover, in these readjustments of the past few weeks motor car manufacturers generally have taken into consideration the need for increased car and truck sales by the 35,000 dealers throughout the country.

The truck business continues to be on a par with general business, but with an improved future just as soon as general construction and road building programmes get under way and railroads perfect their plans for the use of motor trucks for short haul traffic and in connection with store door delivery.

## New Curb Laws on Autos in New York City

Legislation which gives the city magistrates power to revoke or suspend licenses of automobiles on conviction of infractions of the motor vehicle laws, and the reorganization of the automobile licensing bureau under the newly created state tax department, went into effect July 1. Forty-five employees of the old automobile bureau which, up to Thursday, was under the jurisdiction of the secretary of state, were dropped from the state payroll, with an aggregate saving of about \$50,000.

At the same time the National Highway Protective association issued a semi-yearly report, which revealed that 105 more persons were killed in New York city by automobiles since Jan. 1 last than in the same period for 1920, and that during June 75 persons were killed by automobiles here. The statistics also showed that 691 persons were killed in the first six months of the year in streets

and highways, an increase of 180 over the same period last year. There were 74 more persons killed by automobiles outside of the city since Jan. 1 of this year than in the same six months of 1920, and 88 persons were killed in the same territory during the last six months.

In an explanation of the new laws sent to each magistrate several days ago by Chief City Magistrate McAdoo, he gave the grounds on which they could revoke or suspend licenses as follows:

"Three or more convictions for speeding within a year's time. (These may be for any form of speed violation, motor vehicle law of ordinance, anywhere within the state. The offender need not be formally charged and convicted as a third offender.)"

"Failing to register sale or transfer of an automobile; defective brakes or steering gear; using another's badge or

license or allowing another to use one's badge or license; making a false statement; receiving or substituting for another on application for a license or registration or on an examination.

"Any physical or mental disability making it unsafe to drive or the habitual use of drugs or intoxicants; conviction at any time of any felony; persistent violation of traffic laws or ordinances (even though of minor character, if frequent.)"

"Gross negligence or reckless driving, whether or not on jury or damage results. (This will also permit revocation for violation of the so-called automobile assault bill.)"

"Knowingly allowing one's vehicle to be used in aid of a crime; preventing identification of vehicle under one's direction or control; evading arrest while operating an automobile; evading prosecution in another state, having violated the traffic laws thereof."

## Trend of Automobile Prices Continues Downward

THE trend of prices on motor cars is still downward and the indications are that rock bottom will not be reached before fall. Among the notable features of the reductions noted the past month have been that several manufacturers of the higher priced cars have entered the lists, and one or two manufacturers have announced a second reduction since the price-cut wave swept over the country a couple of months ago.

In nearly all instances where reductions have been made an improvement in business has been reported and in some cases factories are back on nearly a normal production schedule. Some makers instead of making an actual cut in price have announced some increase in equipment which appeals to the purchaser of those particular lines almost as strongly as a bona fide cash reduction.

Considered from all angles it would seem that conditions are now about as favorable for the purchase of most any of the standard automobiles as at any time since the war and it is considered by many that prices cannot go much lower.

This opinion is borne out by figures compiled by Frank E. Dawson, chief statistician of the Automobile Club of America, from late price quotations of 100 manufacturers of standard touring cars.

Cars costing up to \$1000 averaged \$637 in 1914, \$865 in 1920 and \$787 on Jan. 1, 1921. The average price today is \$650, only \$13 in excess of the 1914 price, and you have included in the price of the car today equipment or accessories the cost of which in 1914 was in addition to the price of the car itself. The cost of these appurtenances exceeded several times over the difference in the price of the car in 1914 and now.

Cars selling for from \$1000 to \$2000 averaged \$1477 in 1914, \$1595 in 1920, and \$1612 at the beginning of the present year. The average price today, the tabulation shows, is \$1472. This is \$5 under the average price of 1914, and here again equipment generally is included in the present price.

### Expensive Cars Also Less.

Cars in the \$2000-\$3000 class sold for the average price of \$2403 in 1914. There was an increase to \$2664 in 1920, a drop to \$2609 by Jan. 1 of this year and a further drop to \$2445 since the first of the year—a net difference of \$42 between 1914 and present prices.

Cars in the \$3000-\$4000 class sold for the average price of \$3290 in 1914, rose to \$4199 in 1920 (the record year for inflation), tumbled to \$3674 by Jan. 1 of this year and now are selling for the average price or \$3461—a difference of \$171 between the prices paid in 1914 and those of today.

In the case of cars in the \$4000-\$5000 class there has been a more distinct drop in favor of the car buyer. In 1914 the average sale price of the makes included in Mr. Dawson's table was \$4950. In 1920 the price rose to \$5130. By Jan. 1,

1921, even, the price had tumbled to \$4587. Today the average sale price of this class of touring cars is \$4442—\$508 under the 1914 price.

Herewith are given the principal cuts announced during the past month, the most of which were effective July 1:

Model	Old Price	New Price
<b>ALLEN.</b>		
Special Touring.....	\$1495	\$1385
Special Sedan.....	2395	2195
<b>APPERSON.</b>		
Stand. 4-Pas. Sportster.....	\$3500	\$3000
Stand. 7-Pas. Touring.....	3500	3250
Anniversary 4-Pas. Tourster.....	4250	3500
Anniversary 7-Pas. Touring.....	4250	3750
Stand. 7-Pas. Sedan.....	4500	4500
Stand. 4-Pas. Sedanet.....	4500	4500
Limousine-Sedan, 7-pas.....	4700	4700
<b>BARLEY.</b>		
4-Pas. Touring.....	\$3250	\$2985
Roadster.....	3375	3150
4-Pas. Sport.....	3375	3150
7-Pas. Touring.....	3400	3250
4-Pas. Coupe.....	4250	3985
5-Pas. Sedan.....	4250	4100
5-Pas. Limousine.....	4500	4000
5-Pas. Landulet.....	4650	4000
<b>BRISCOE.</b>		
Touring.....	\$1285	\$1085
Roadster.....	1285	1085
Sedan.....	1885	1655
Coupe.....	1885	1685
<b>CASE.</b>		
Four-Pas. Sport.....	\$2650	\$2250
Seven-Pas. Touring.....	2650	2250
Coupe.....	3400	2900
Sedan.....	3750	3285
<b>COLE.</b>		
Touring.....	\$3250	\$2795
Sedan.....	4450	3995
<b>DORT.</b>		
Touring.....	\$1115	\$985
Sedan.....	1835	1685
<b>ELCAR.</b>		
5-Pas. Touring Model D-4.....	\$1495	\$1195
5-Pas. Model D-6.....	1795	1385
5-Pas. De Luxe, Model D-6.....	1595	1595
4-Pas. Sportster, Model H-4.....	1495	1195
4-Pas. Sportster, Model H-6.....	1795	1385
4-Pas. De Luxe, Model H-6.....	1595	1595
3-Pas. Roadster, Model R-4.....	1495	1195
3-Pas. Roadster, Model R-6.....	1795	1385
3-Pas. De Luxe, Model R-6.....	1595	1595
3-Pas. Coupe, Model K-4-20.....	2095	1595
3-Pas. Coupe, Model K-6.....	2395	1735
3-Pas. De Luxe, Model K-6.....	2395	2395
4-Pas. Suburban, Model S-6.....	2495	2495
5-Pas. Sedan, Model G-4-20.....	2195	1695
5-Pas. Sedan, Model G-6.....	2495	1895
5-Pas. De Luxe, Model G-6.....	2495	2195
<b>HANDLEY-KNIGHT.</b>		
7-Pas. Touring.....	\$2985	\$2850
Prices of Sedan and De Luxe models remain unchanged.		
<b>HOLMES.</b>		
Touring.....	3350	2950
Roadster.....	3350	2950
Coupe.....	4350	3900
Sedan.....	4550	4100
California Sedan.....	3900	3200
<b>KISSEL.</b>		
De Luxe Speedster.....	\$3775	\$2975
De Luxe Touring.....	3775	2975
De Luxe Tourster.....	3775	2715
De Luxe Coupe.....	4575	3775
De Luxe Sedan.....	4575	3775
De Luxe Urban-Sedan.....	4950	4150
De Luxe Coach Sedan.....	4575	4575
Standard Touring.....	3475	2475
<b>LEXINGTON.</b>		
Touring, Model S.....	\$2285	\$1885
Thorobred, Model S.....	2285	1985
Lex-Sedan, Model S.....	2785	2185
Coupe, Model S.....	3250	2750
Sedan, Model S.....	3350	3150
Touring, Model T.....	2985	2785
Sedanette, Model T.....	4150	3750
<b>LIBERTY.</b>		
Touring.....	\$1795	\$1595

Model	Old Price	New Price
Roadster.....	1795	1595
Sport.....	1985	1675
Coupe.....	2825	2400
Sedan.....	2850	2495

### MOON.

Touring, Model 6-48.....	\$2385	\$1985
Roadster, Model 6-48.....	2485	2085
Sedan, Model 6-48.....	3385	2355
Coupe, Model 6-48.....	3385	2985
Touring, Model 6-68.....	2885	2485

### NASH.

5-Pas. Touring, Model 6.....	\$1695	\$1545
2-Pas. Roadster, Model 6.....	1695	1525
4-Pas. Sport, Model 6.....	1695	1695
7-Pas. Touring, Model 6.....	1875	1695
4-Pas. Coupe, Model 6.....	2650	2395
7-Pas. Sedan, Model 6.....	2895	2695
5-Pas. Touring, Model 4.....	1395	1195
2-Pas. Roadster, Model 4.....	1395	1175
3-Pas. Coupe, Model 4.....	1935	1735
5-Pas. Sedan, Model 4.....	2185	1935

### NATIONAL.

Sextet 7-Pas. Touring.....	\$3750	\$2990
Sextet 2-Pas. Roadster.....	3750	2990
Sextet 4-Pas. Phaeton.....	3750	2990
Sextet 4-Pas. Coupe.....	4900	3990
Sextet 7-Pas. Sedan.....	4950	3990

### OLDSMOBILE.

Roadster, Model 43-A, 4-Cyl.....	\$1445	\$1325
5-P. Tour., Model 43-A, 4 Cyl.....	1445	1345
Coupe, Model 43-A, 4-Cyl.....	2145	*1895
Sedan, Model 43-A, 4-Cyl.....	2145	*2100
Tour., Model 37-A, 6-Cyl.....	1450	1450
Roadster, Model 37-A, 6-Cyl.....	1450	1450
Coupe, Model 37-A, 6-Cyl.....	2145	*2145
Sedan, Model 37-A, 6-Cyl.....	2145	*2145
4-Pas. Tour., Model 47, 8-Cyl.....	1725	*1725
Coupe, Model 47, 8-Cyl.....	2225	*2225
Sedan, Model 47, 8-Cyl.....	2395	*2425
Pacemaker, Model 46, 8-Cyl.....	2100	*1825
7-Pas. Tour., Model 46, 8-Cyl.....	2100	*1875
7-Pas. Sedan, Model 46, 8-Cyl.....	3300	*2775

\*Now equipped with cord tires.

### PACKARD.

Sedan, Model 3.....	\$4250	\$3775
Twin-Six Touring.....	6000	1850
Twin Six Sedan.....	8450	6800

### PREMIER.

4-Pas. Open Model.....	\$4600	\$3690
4-Pas. Sedan.....	6000	5090
7-Pas. Open.....	4600	3890
7-Pas. Sedan.....	6100	5190
Coupe.....	5800	4690
4-Pas. Art. Craft Top.....	5000	4090
7-Pas. Art. Craft Top.....	5000	4290

### ROAMER.

Touring Model 6-54-E.....	\$3550	\$3250
Sedan, Model 6-54-E.....	4850	4500
Touring, Model 4-75-E.....	4250	3985

### SAXON.

Duplex Touring.....	\$1675	\$1495
Duplex Sedan.....	2475	2295
Duplex Coupe.....	2475	2295
Duplex Blackstone.....	1695	1695

### STANLEY STEAMER.

5-Pas. Phaeton.....	\$4200	\$2900
7-Pas. Touring.....	4200	2900
4-Pas. Coupe.....	5950	4100
7-Pas. Sedan.....	6100	4250

### STEPHENS.

Touring.....	\$2400	\$2065
Sedan.....	3400	3100

### STUTZ.

Roadster, Model K.....	\$3900	\$3250
Bearcat, Model.....	3900	3250
Close-Coupled 4-5 Pas.....	4000	3350
Touring, 6-7 Pas.....	4000	3350
Coupe.....	5200	4800
Chassis.....	2800	2750

### TEMPER.

Touring.....	\$2885	\$2385
Sedan.....	3785	3185

### VELIE.

5-Pas. Touring, Model 48.....	\$1585	\$1585
Sedan, Model 48.....	2485	2485
Speedster, Model 48.....	2200	1890
7-Pas. Touring, Model 48.....	1950	1950
Touring, Model 34.....	1385	1385
Sedan.....	2485	2085
Roadster.....	1485	1385



## Late Developments in Passenger Car Body Types

**T**HE Universal Body Corporation of Mishawaka, Ind., announces that it is making shipments of its Model D five-passenger and roadster bodies for Ford chassis. The Universal body was originated and perfected by the Universal Body Corporation, which incorporates the use of a specially patented extension which lengthens the wheelbase to 120 inches. The use of this extension in connection with the Universal body with its tapestry upholstery gives the completed car the riding qualities and appearance which compare very favorably with a car selling at two or three times the price.

The specifications are as follows:

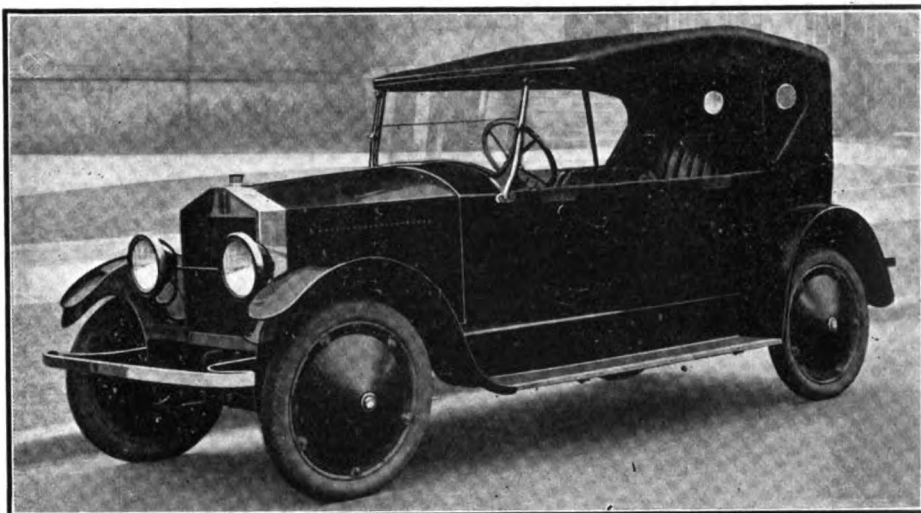
**Radiator Shell**—Polished Nickel Finish, Rolls-Royce Type, Constructed so as to Increase the Amount of Air Passing Through the Radiator.

**Hood**—Extra Long and Well Ventilated.

**Windshield**—Made in Two Adjustable Sections and Is Given a Non-Rust Finish.

**Head Lights**—Large Electric with Suitable Bulbs and No Glare Lenses Are a Part of the Regular Equipment.

**Running Boards**—Substantial, Linoleum Covered and Aluminum Bound.



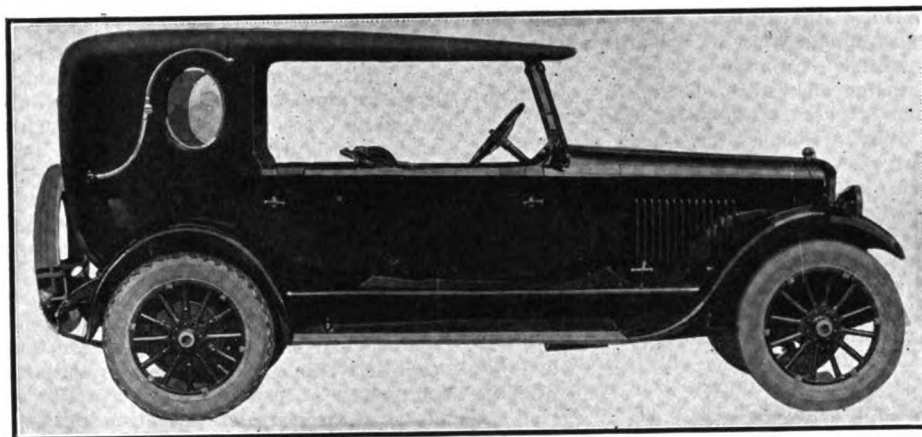
Ford Car Equipped with Universal Model D Touring Car Body.

Made up with Cathedral Piping, Soft Springs and Curled Hair. The Standard Finish Is Pebble Grained Black. Spanish Brown Is Optional, with No Extra Charge.

### TOUR COACH IS AN INNOVATION.

The Tour-Coach, a product of the Andrew C. Sisman Co., Detroit, Mich., represents the latest developments in attached enclosed bodies for various makes of cars. It has been developed by Horace C. Mills, one of the pioneers in the distribution of tops of the California type.

The particularly impressive feature of the Tour-Coach is that it lacks all appearance of being attached. The method of joining to the body is carried out in such trim fashion that it is difficult to distinguish a Tour-Coach equipped car from a factory built enclosed vehicle. It is so light in weight that it entirely obviates the objection of sidesway and lack of balance created by the ordinary enclosed car. Moreover, it is so designed that the entire set of panels can be quickly and easily removed, giving a conventional open car for hot weather driving. Storm curtains are provided for emergency when the open car is used. The large factory is equipped for production of Tour-Coaches on a quantity scale to start immediately. The Road-Coach is now being developed for cars of the roadster type. These coaches sell at an unusually attractive price.



Studebaker Big Six Equipped with Tour-Coach Body with Side Panels Removed.

**Fenders**—Best Type of Enameled Steel, Deep Flange, Rolled Crown.

**Bumpers**—Heavy Steel, Both Front and Rear, Furnishing Ample Protection for the Radiator, Body and Fenders.

**Top and Covers**—A Double Woven Fabric Top of Special Design with Side Curtains, with Windows of the Best Transparent Fabric. Two Plate Glass Windows Are Placed in the Back Curtain. A Regulation Envelope Is Provided for the Protection of the Top When Down.

**Side Curtains**—In Addition to the Regular Sectional Side Curtains the Rear Section Is Provided in Two Portions, Which Gives a Full "Victoria" Quarter if Desired.

**Wheel Discs**—The Standard Ford Wheels Are Strengthened by Patent Heavy Steel Discs, Which Are Fitted on the Inside and Outside of All Wood Wheels.

**Steering Wheel**—Extra Large.

**Instrument Panel**—Polished Hardwood Mounted Under the Cowl.

**Carrier Basket**—Installed on Steel Extensions on the Rear of the Body, Providing Space for an Extra Tire and Luggage Carrier. The Rear License Plate May Be Mounted on This.

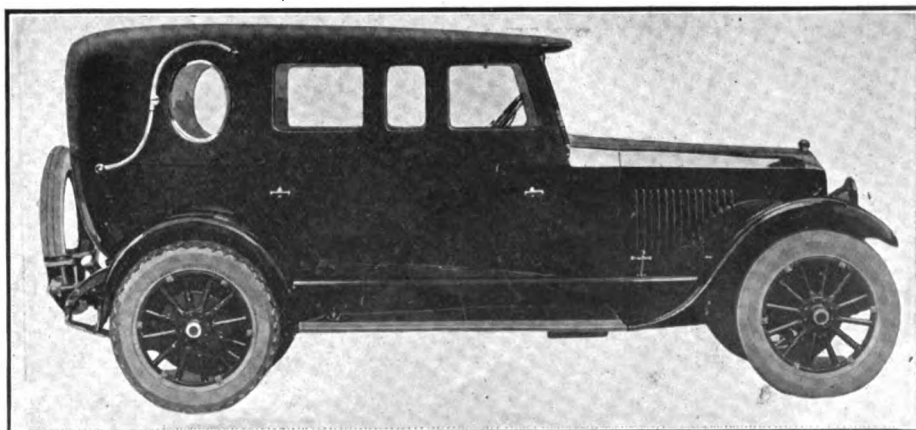
**Front Seat**—Cushion and Back Adjustable to Three Positions, Thus Accommodating Both Tall and Short Drivers.

**Rear Seat**—Adjustable to Any One of Four Positions.

**Upholstering**—Finest Quality Imitation Leather Fabric Throughout; Cushions Are

**Body Finish**—The Bodies Are Furnished in Any One of the Five Standard Colors: Holland Blue, Saginaw Red Deep, Gunmetal Grey Light, Black, Garibaldi Green. All Fenders Are Black.

Universal bodies with the above standard equipment are now being shipped from Mishawaka at a price of \$500, plus war tax, f. o. b. Mishawaka, Ind.



Tour-Coach Complete Body Equipment on Studebaker Big Six—Note Artistic Manner in Which Body Is Attached, Which Makes It Hard to Distinguish It from a Factory Built Enclosed Car.

## Auto Quickest Method of Transportation

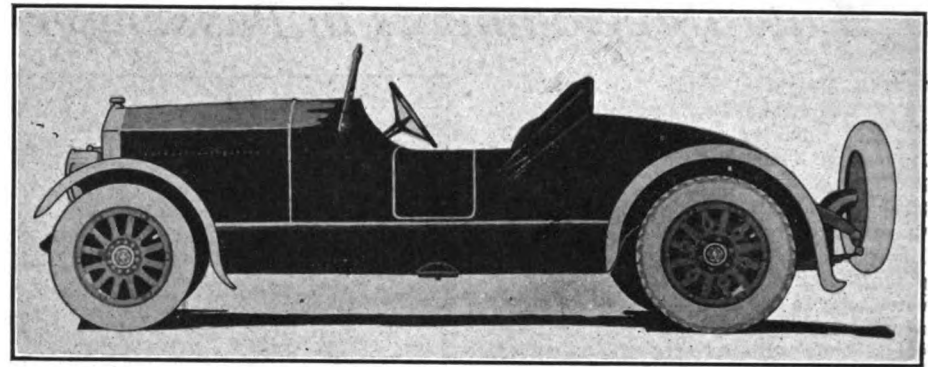
**T**HE operation of power-driven vehicles introduces a new element which must be recognized and understood. For instance: In the old days of stage transportation there was a system, it is true, but it was rather loosely organized. There was no necessity for close and scientific checking. It was easy to ascertain the passenger and freight capacity of a stage coach, how many horses could be used conveniently and economically, how far they could travel in a certain number of hours.

Repairs, upkeep and general overhead expense could easily be estimated. In short, it was a comparatively easy matter to determine the maximum expense of operation and the maximum efficiency for a stage coach line. One was dealing with simple mechanical and physical factors—one easily understood the limitations of stage transportation and likewise the full extent of the service that would be demanded of it.

Then came rail transit. The tremendous increase of efficiency opened up vistas of possibilities which seemed almost unlimited. But immediately new problems, new conditions arose. The transition from the limited power of horse hauled vehicles to steam was such a revolution of old transportation methods, so vastly superior that it demanded a much higher degree of organization. Every one knows the history of railroad organization from the comparatively crude methods of the early part of the 19th century to the highly organized, scientific system of today, which, however, due to the tremendous increase in the demands upon transportation facilities, is far from perfect.

### Truck and Horse-Hauled Transportation Compared.

Motor truck transportation compared to horse-hauled wagons is an exact parallel of rail compared to the stage coach. The difference lies only in the magnitude of operations and with the rapid



Two-Passenger Roamer Car. Made by Roamer Motor Corporation, Danvers, Mass.

development of motor transportation the magnitude of motor operations is rapidly approaching that of rail operations.

The necessity of better organization of transportation service when motorized service is installed is clearly recognized. The change from wagon trucks to motor is in itself the first step towards better organization.

Motor transportation, however, is so vastly superior to old methods that it opens up possibilities of development which affects every department of a business institution. One hundred per cent. efficiency in its organization reacts favorably—promotes efficiency all along the line—facilitates better the organization of every other production unit.

Why? Because organized transportation service based on motor transportation, permits wider scope of action—the better handling of merchandise—hence a better opportunity to increase business. Increased business means increased production and increased production necessitates better organization of every department. And this organizing is made easier because one vital, fundamental factor, transportation, has been organized to a high degree of efficiency.

The tremendous demands upon rail transportation today are the direct result of developments that rail transit made possible. If stage coaches, canals and sailing vessels were still the only transportation facilities, how far could industry have progressed?

### MOTOR CAR REPLACES LOCOMOTIVE AND COACH.

W. H. Wright, superintendent of the Savannah division of the Central Railroad of Georgia, inspects the property of his division with more comfort, thoroughness and speed, and at a lower cost than most divisional superintendents in America. In former days he covered his division with a special train consisting of a locomotive and coach, which required the services of an engineer, fireman and conductor.

To attain greater flexibility in his regular inspections he had a Dodge Brothers motor car equipped with standard-gauge, steel-flanged wheels. This unique car is driven by Mr. Wright and, in addition to the occupants, it carries the varied accessories necessary to the superintendent in his work. At times the car is dispatched down the road ahead of important passenger trains, so confident are the officials of the engine's power and reliability. It proved so successful in several years of operation that other divisions have been similarly equipped. At present there are 10 or more of the cars in operation on railroads in and around Atlanta.

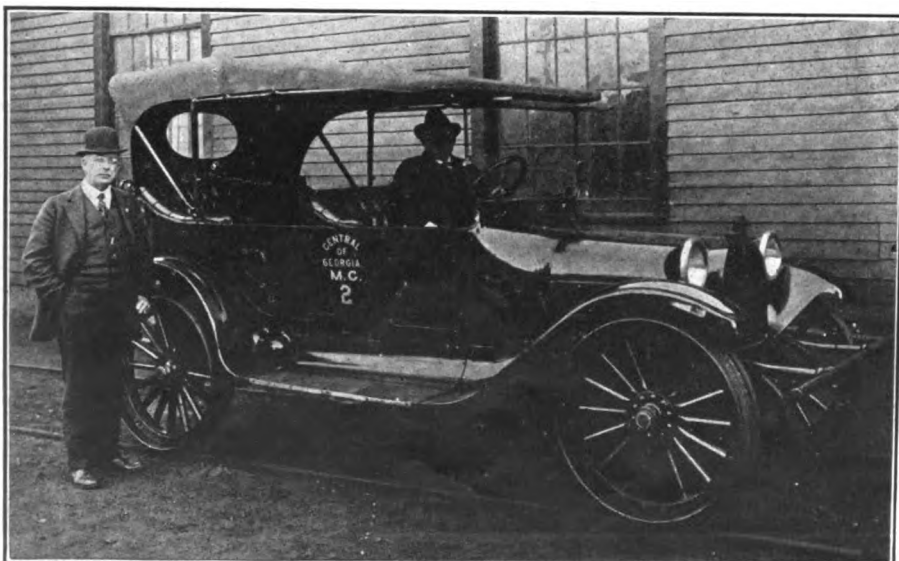
### ROAMER PASSENGER CARS.

The Roamer Motor Corporation, with factory located at Danvers, Mass., and executive offices at 43-57 Cornhill, Boston, Mass., offers the motoring public a line consisting of three models which are claimed to be the finest product of the passenger car builder's art.

The line comprises a five-passenger touring car, two-passenger roadster and a two-passenger sport model. The same chassis is used for the three models and the same grade of equipment is used throughout.

### SPECIFICATIONS.

**Engine**—Continental Six-Cylinder, L-Head Type, Cast En Bloc.  
**Bore and Stroke**—3¼ by 4¼ Inches.  
**Horsepower**—S. A. E. Rating, 25.35;  
 Brake, 55 at 2600 Revolutions Per Minute  
**Ignition**—Delco from Storage Battery.  
**Starting and Lighting**—Delco System.  
**Carburetor**—Zenith, Vacuum Feed.  
**Cooling**—Water Pump, Centrifugal Type.  
**Clutch**—Multiple-Disc.  
**Transmission**—Unit with Engine, Three-Speed, Selective.  
**Rear Axle**—Columbia Floating Type.  
**Final Drive**—Through Hotchkiss Drive.  
**Final Gear Ratio**—4.67 to 1.  
**Wheelbase**—120 Inches.



Dodge Car Used for Railroad Inspection Work in Georgia Equipped with Standard Gauge, Steel-Flanged Wheels.

## FOX AIR-COOLED CAR.

After a period of experimental work to determine the weak points in the construction of this type of car and to eliminate them when found, the Fox Motor Co., Philadelphia, Pa., states that they will soon be in production on the new Fox air-cooled five-passenger touring car, which it is claimed will embody many features which are demanded by exacting motoring conditions.

The company is located in one of the finest industrial structures in Philadelphia, at North Seventh street and Grange avenue. This thoroughly modern, fire-proof plant comprises 100,000 feet of floor space and will be equipped throughout with the most advanced machinery and appliances. A covered loading platform with a private railroad siding affords direct connection with the main line of the Philadelphia & Reading railway.

The Fox Co. will build air-cooled cars exclusively. The engine, designed by Ansley H. Fox, will be constructed in the Fox plant and it is expected that production will start in the autumn.

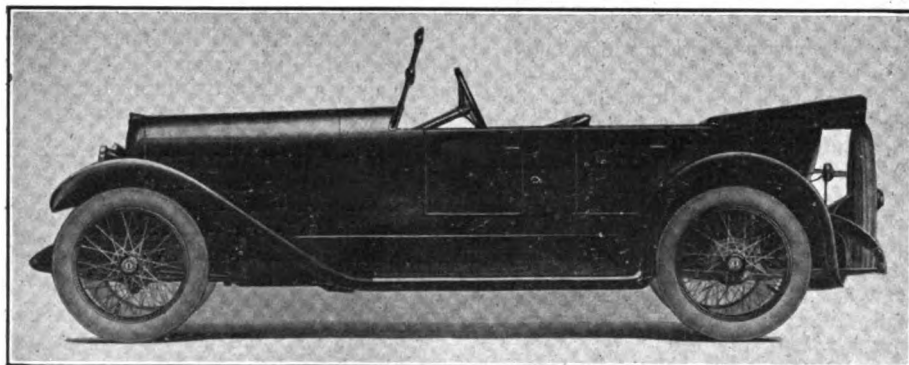
The five-passenger touring car, with 132-inch wheelbase, will be sold for \$3500. The body types will comprise touring car, roadster, coupe and sedan.

## INDIA RUBBER OPENS DALLAS BRANCH.

The India Tire & Rubber Co., Akron, O., announces that it has opened in Dallas, Tex., a direct factory warehouse, in charge of Harry L. Corbett, formerly affiliated with the Norwalk Tire & Rubber Co. Mr. Corbett will have as assistants C. V. Moore, J. Y. McKinney and L. G. Trench. Messrs. Moore and McKinney until recently were connected with the Norwalk Tire & Rubber Co., while Mr. Trench has been with the Norwalk Tire Co.

## LEE REPORTS INCREASE IN SALES.

J. J. Watson, Jr., president of the Lee Rubber & Tire Co., New York City, in a letter to stockholders says that the improvements in sales since April 1 has been so marked that it has been necessary to operate day and night, with the



Fox Air-Cooled Five-Passenger Touring Car, Which Will Soon Be Under Production.

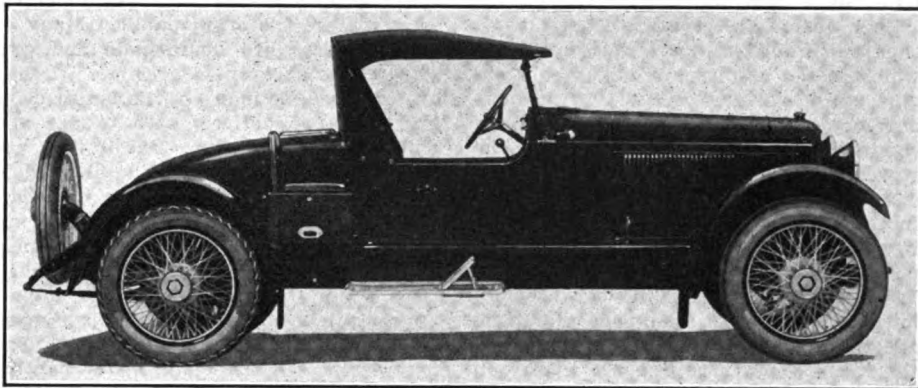
result that new record production figures have been established. The letter adds that current earnings are running well ahead of dividend requirements.

## Paige Daytona Roadster a Sportsman's Job

THE Paige-Detroit Motor Car Co., corner of Fort and McKinstry streets, Detroit, Mich., in announcing its new Paige 6-66 Daytona roadster, states that it is primarily a sportsman's job. The new roadster has speed, abundant power,

space to accommodate full touring equipment. The compartment is painted white and fitted with an electric light, which is switched on when the door is opened.

The equipment includes five wire



New Paige 6-66 Daytona Roadster, Made by the Paige-Detroit Motor Car Co., Detroit, Mich.

and the streamline body and turtle back of a racing job. Without detracting from these sporting characteristics, however, the effort has been made to add, wherever necessary, the equipment to make it a comfortable all-seasons car with a utility beyond that of a mere speedster.

To this end a wide, comfortable, deeply upholstered driving seat has been fitted to replace the usual skeleton bucket seats. A narrow windshield over the cowl gives added protection. The top, conveniently equipped with tight-fitting storm curtains, swinging freely with the doors and giving complete protection from the weather, is demountable and can be lifted free of the body and left in the garage by removing just two screws and 12 thumb fasteners.

Two wide doors, set flush in the body sides, give access to the seat from either step. A second door on the right side of the body, when pulled out, reveals an extra sliding seat well upholstered and equipped with an arm rest. A foot plate, tilted for the comfort of this third passenger, folds flush into the aluminum running board when not in use.

wheels of very rugged construction and four 33 by 4½-inch cord tires. The fenders follow closely the curve of the wheels and are provided with patent leather splash flaps. A short aluminum running board is fitted to the right side and a single step to the left. Hartford shock absorbers still further soften the action of the long, semi-elliptic springs.

The Daytona model is finished in deep red for the body. The upholstery is high-grade, heavy blue leather with a hand-crushed finish. The wheels are enamelled in blue to match the upholstery while the running gear, fenders and lamps are black. A nickelled radiator adds a pleasant finishing touch.

Bullet side lamps, a cowl ventilator, safety latches on the doors, electric clock, cigar lighter and a muffler cut-out are fittings that detract nothing from the speed and add much to the comfort and attractiveness of this car. Brief specifications follow:

## SPECIFICATIONS.

**Engine**—Continental Six-Cylinder.  
**Bore and Stroke**—3¼ by five-inch.  
**Horsepower**—33.75 S. A. E. Rating.  
**Cylinders**—Cast En Bloc, L-Head Type.  
**Ignition**—Atwater-Kent System.  
**Lighting and Starting**—Gray & Davis.  
**Carburetor**—Rayfield, Vacuum Feed.  
**Clutch**—Dry Plate.  
**Transmission**—Three-Speed Selective in Unit with Engine.  
**Rear Axle**—Salisbury Three-Quarter Floating.  
**Tires**—33 by 4½-Inch.  
**Wheelbase**—131 Inches.

## COMPANIES PASS DIVIDENDS.

The Federal Rubber Co., Cudahy, Wis., has omitted the quarterly dividend of 1¼ per cent. on the first preferred stock.

Directors of the Fisk Rubber Co. have voted to omit the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable Aug. 1.

The United States Rubber Co. passed its quarterly dividend of \$2 a share on common stock. A quarterly dividend on preferred stock was declared.

Opposite the auxiliary seat another door with a Yale lock gives access to a very commodious water-proof locker under the turtle deck, in which there is

## Causes of Automobile Fires and How to Prevent Them

**A**UTOMOBILE fires are of rare occurrence, for which motorists are thankful, but when they do occur, unless the motorist is familiar with the means of putting out the fire, it is very liable to be destructive.

Such fires are usually caused by a backfire through the carburetor air inlet, which is the result of racing a cold engine, or weak inlet valves. If the carburetor air inlet is turned upwards or is connected by tubing or pipe with the stove on the exhaust pipe there is little danger of a fire occurring at this point. In the older style carburetors and even in some of the later types, the air inlet points downward into the pan. When a backfire occurs, if gasoline has been allowed to collect in the pan, the flame shooting out from the air inlet ignites the fumes, in turn setting fire to any oil or grease that may be in the pan, resulting in a good hot fire. Unless checked at the start the car burns quickly, damaging the engine and many of the other units of the chassis. Therefore, the drip pan should be kept free from gasoline and no leaks in the gasoline pipe or its connections allowed to develop.

The exhaust pipe is also a source of fire if improperly installed or if the car is driven with retarded spark for any length of time, or if racing is attempted by the driver an overheated exhaust pipe will result.

The exhaust pipe becomes unusually hot when the engine is operated with a greatly retarded spark and it has been known to set the adjoining wood work afire when the wood work is fitted too closely. Many manufacturers carry the exhaust pipe forward and bring it down low from the front of the chassis, usually below the frame side members. This is good practise as it removes the possibility of an overheated exhaust pipe causing a fire or the heat from the pipe affecting the occupants of the front compartment of the car.

Fires have been known to catch by opening the muffler cut-out when starting up the engine. This danger is greater inside the garage than out of doors, as there is usually more or less spilled gasoline and grease on the garage floor. The cut-out should be opened only when the car is standing out doors if it is necessary to speed up the engine for any reason.

Running a car at high speed for a long distance may cause the exhaust pipe to overheat. If it is next to any wood work this may cause a fire, especially if there is an accumulation of grease and oil on the wood work. Therefore, minimize the danger by driving the car a little slower than top speed and by keeping the wood work free from grease and oil.

### Fire Caused by Short Circuit in Wiring System.

Another cause of fire comes from the short-circuiting of the ignition or lighting system. A short circuit may heat one of the wires red hot and burn off the insulation. If there is any accumula-

tion of grease, oil or gasoline near by, a fire may start that will be difficult to extinguish.

Several fires have been known to start from the use of some of the so-called spark intensifiers which have been offered to the motoring public. Many of these devices are home-made and constructed as cheaply as possible. If they are enclosed, as many of the better class are, they are entirely safe to use and will give good results. But if they are not enclosed and the spark is allowed to occur in the open and by chance the carburetor is leaking or other leaks are present in the fuel pipe and its connections, the gasoline vaporizes quickly, rises under the hood around the engine, and is quickly ignited by the open spark in the gap of the intensifier and a bad fire results. Grease or oil in the pan assists the burning and often the car is badly damaged before the fire is extinguished.

This usually happens after a car has been standing with the engine stopped. Upon starting the engine the vapor, which rises around the engine under the hood, catches fire from the open spark gap and a dangerous fire results.

Static electricity will, in rare instances, cause a gasoline fire that is hard to put out. Almost all tunnels used in filling the fuel tank are covered with chamois to prevent the passage of water. The funnel usually rests on the wooden cover about three-eighths of an inch above the tank and the gasoline passing through the chamois sets up static electricity, which will cause a spark between the tunnel and the top of the tank. The spark ignites the vaporized gasoline issuing from the filling hole of the tank and a bad fire results.

The way to obviate this trouble is to make sure that the tunnel fits snugly on the top of the tank, thus preventing the spark from jumping.

### Protection Is Advised.

It is taken for granted that the owner has insured his car against loss by fire. His car is much more apt to burn than his residence, and practically every house owner nowadays protects his home through fire insurance. Another form of fire insurance protection which ought to be a part of the equipment of every car is one or two fire extinguishers. Some fire insurance companies insist that there be extinguishers on all cars they insure, and most insurance concerns give a reduced rate to cars thus equipped.

Even after having taken all precautions to prevent the automobile or truck from catching fire, you may be surprised some day to find it in flames. It is worth while to have in mind what to do on discovering that the car is on fire. The time required to figure this out after a fire has started may mean a heap of twisted ruins instead of an automobile.

Grab your fire extinguisher. Locate the position of the fire and work the extinguisher to the limit. Do not be afraid of an explosion. There will not be any.

Get as near to the blaze as you can without being burned.

### Sand or Salt Will Put Out Gasoline Fire.

Water is not of much use in extinguishing burning gasoline vapor as the water, instead of putting out the flame, simply spreads the gasoline over a larger area, allowing the flames of the burning vapor to do still greater damage. Sand and salt will put out such a blaze much better than water. One of the best materials to use in case of fire is carbon tetrachloride compound, which is the base or powder used in liquid fire extinguishers. It is, however, much better and safer to use this compound through the medium of an extinguisher.

The man who can afford a car can certainly afford the general satisfaction that comes from having fire insurance policy and fire extinguishers and from taking every possible precaution to prevent the car burning.

The principle involved in putting out a gasoline vapor fire is that of smothering it and any material that will give the smothering effect will certainly prove an aid in putting out automobile fires.

### DRAIN THE VACUUM TANK.

At the bottom of the vacuum tanks, which are now used on many cars in the fuel feed system, there is located a drain cock. This should be opened at intervals of once a week or so. Generally a little water and possibly some rust will flow out before gasoline begins to come. In some cases it may be necessary to insert a small piece of wire to clean out the drain cock of an accumulation of sediment. If this is permitted to remain long it may work its way back into the carburetor and cause trouble.

### CINDERS FOR GARAGE FLOOR.

When one does not care to go to the expense of laying a cement floor in the small home garage, use may be made of cinders, which have proved admirably adapted to making a dustless floor. Six inches of cinders well wet down with a hose and tamped solid will be required. It will be found that this floor will readily absorb oil and grease. The cost of laying such a floor is simply for hauling the cinders, spreading and tamping.

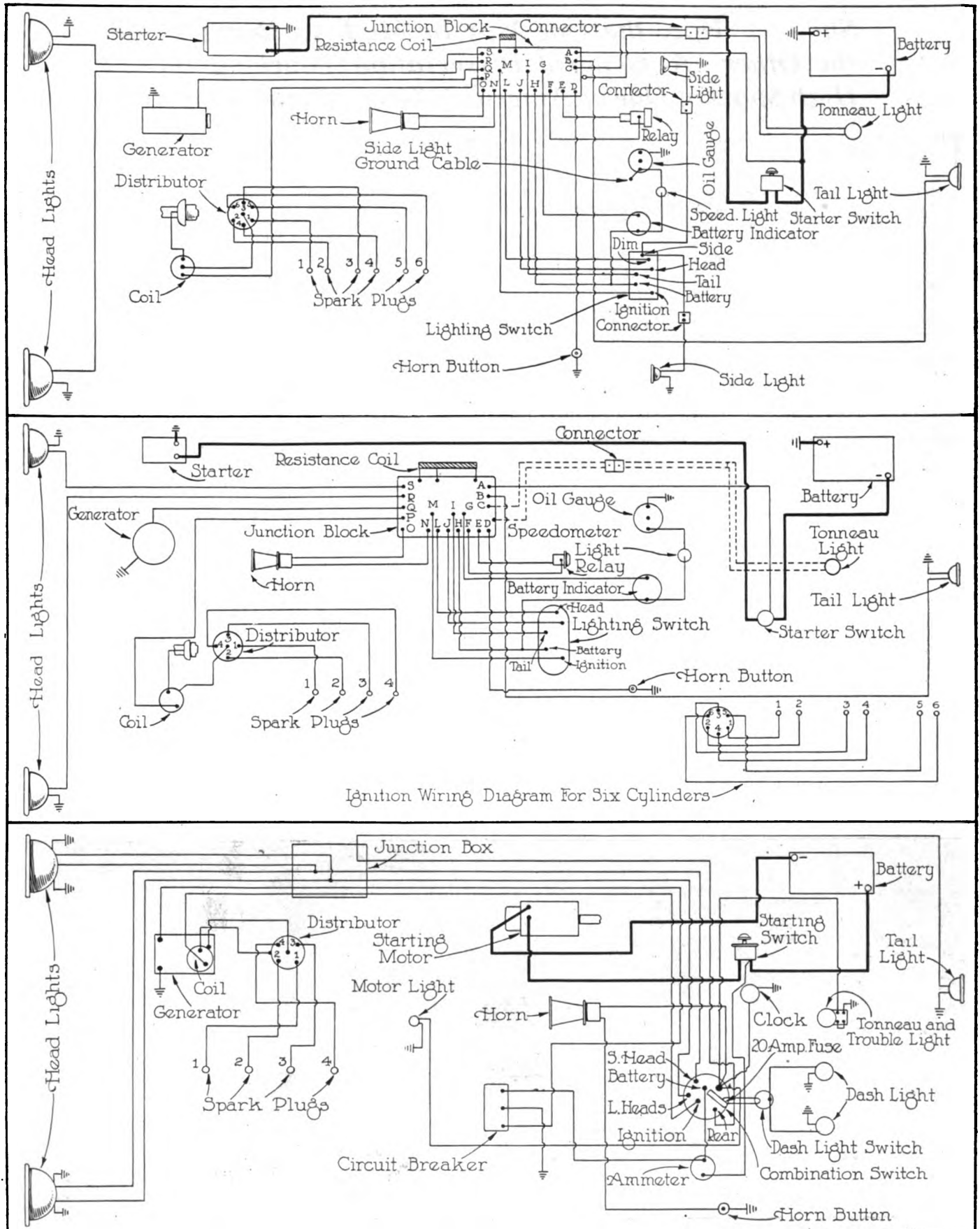
### HOME REMEDY FOR JOINTS.

Brown shellac mixed with graphite makes an admirable cement for pipe joints and connections which are subject to heat and compression. The two ingredients should be mixed to a paste and smeared over the joint needing treatment.

Through an official announcement of the Havnes Automobile Co., Kokomo, Ind., the Brock Motor Car Co., 4416-20 Olive street, St. Louis, becomes retail dealer for Havnes character cars.



# Monthly Wiring Diagram, No. 17



Top—Studebaker Big Six and Special Six, Series 20, 1920. Center—Wagner System Starting and Lighting Studebaker, 1918-1919. Bottom—Sheridan Four-Cylinder Car of 1921 Using Single-Wire Two-Unit System Starting and Lighting.

# Accessories and Success

## *Showing How the One May Be Made to Bring About the Other—A General Dissertation Touching on the High Spots of One of America's Great Retail Industries*

**T**HE average car owner, regardless of how well equipped his machine may be, is always a prospect for the sale of accessories. The accessory is its own best salesman, as it is always practical and, for this reason commends buying attention that results in sales. It usually offers the solution of some problem that has inconvenienced the driver of the car and may be said to sell strictly on its merits.

some one specific thing that is of interest to him. As he looks at the article his interest changes to desire, which in turn gives place to action and he walks inside and makes his purchase.

This means that the window display must be such as to first of all attract the customer's attention and concentrate it on some one specific object. If it does not do this it has failed to function efficiently. It naturally follows that the

shops, with fair sized windows, will display but one article at a time, knowing from experience that they get much better results from this method than by displaying a large assortment of goods.

The accessory store with the greatest stock does not necessarily do the largest business. Frequent turnover is the determining factor and a small store with "live numbers" on its shelves will frequently do a far greater volume of

Don't buy too heavily. Don't let old stock accumulate. If you find that certain items don't sell, cut the price on them and get rid of them. Watch your overhead expenses. Take a frequent inventory and make your stock-on-hand balance with your sales record. Install a good accounting system and see that it is attended to by a competent bookkeeper. Keep shelves clean and orderly. Be courteous to customers.

Nine out of every 10 accessory sales made are the direct result of proper display, and the forward looking dealer fully realizes that this is true and profits by his knowledge. The attention compelling window display is one of the best aids to a successful accessory business that the store owner can have and he will find that the time and effort spent in studying out new ways of dressing his windows will return substantial dividends.

The successfully planned window display does just four things: First, it attracts attention; second, it arouses interest; third, it impels desire, and fourth, demands action. In effect it works out about like this: The customer, in walking past the dealer's store, sees a window display that attracts his attention. He stops. At about the time he comes to a halt his attention becomes centered on

window must not be too well filled with different articles, otherwise the customer will give it but an abstract glance in passing, which will of course defeat the purpose for which the display is intended.

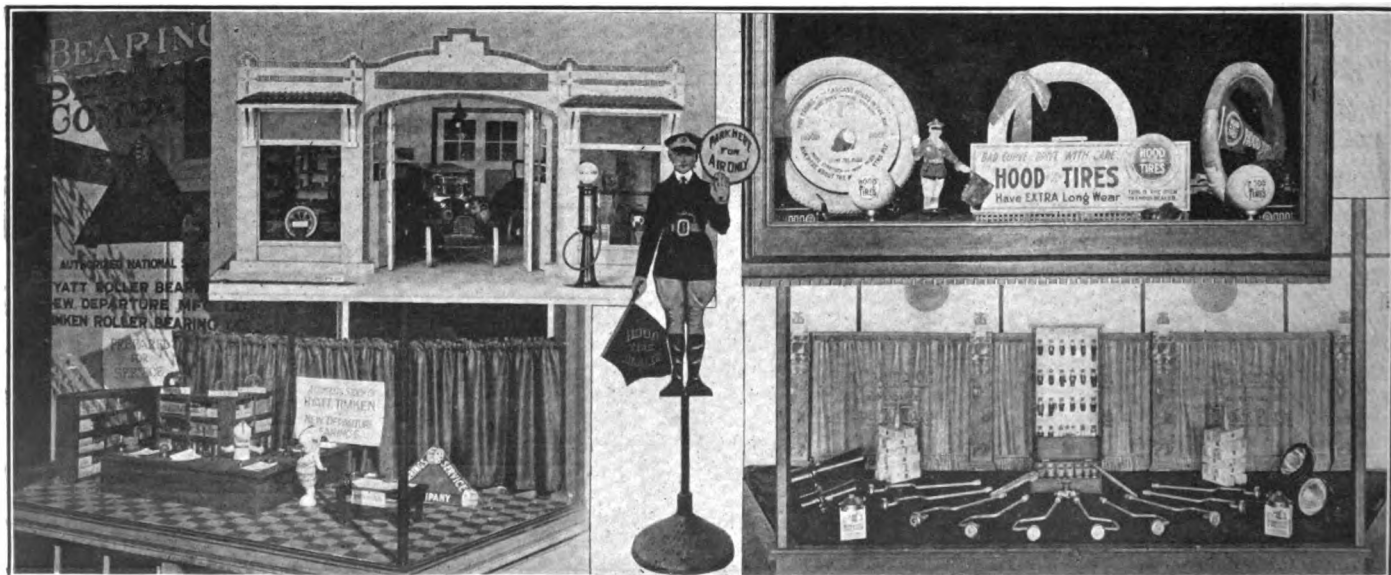
One frequently sees examples of faulty window dressing where it appears as though the decorator had seemingly crowded the entire contents of the store into the front window. There has been little attempt at concentrating the customer's attention, with the result that the window, while it may attract the passing glance, does not arouse specific desire.

A few articles, well displayed on contrasting backgrounds, will bring more business than a whole window filled with a variety of different articles. One sees the idea of concentrating attention carried to extremes in the women's specialty shops of Chicago. Many of these

business in the run of a year than the big store with a large, slow-moving stock.

This fact is strikingly called to mind by the experience of two brothers in a southern city. They both were graduated from the local high school within a year of each other. Being inclined toward business the two young men pooled their available capital and opened a small accessory store.

The first year, by acting as salesmen, bookkeepers and general utility men, they established a profitable business. Their store was always busy and the stock moved rapidly. They found that they were turning many items as often as once a month. Other items sold somewhat more slowly, but there wasn't an actual "dead" number on the list of stock carried and by the beginning of the third year they found that the average turnover of all articles for the previous 12



The Illustrations on These Pages Offer Exceptionally Good Examples of Attractive Attention Compelling Window Trimming. The One at the Upper Left Is Decidedly Unique. The Upper Right Depends on a Black and White Combination for Effectiveness, While the Two Lower Ones Attract and Hold the Eye by the Use of Cleverly Arranged Draperies.

months had been at the rate of 9% times. Thus, even though the store was small, the actual margin of profit had been great.

At the beginning of the fifth year they were doing about all the business that could be conveniently handled and the stock was still showing a very desirable turnover. The younger brother was satisfied to let things go on as they were. He couldn't see the wisdom of moving into larger quarters and branching out in the manner that the elder brother desired. His share of the profits, aside from a very satisfactory salary, had aver-

aged close to \$2000 yearly. The business was clear and he had built a small house, which was bringing in a very desirable rent.

He had stocked only such items as would sell well, and had turned its investment many times.

#### Stock Must Be Varied.

Of course a stock must be varied if the dealer is to supply his trade, but this does not necessarily mean that it must contain a lot of slow moving merchandise.

Articles for which the demand is small, regardless of the gross profit made on them, are frequently a source of loss to the dealer, whereas an article that is a fast seller makes money even though the actual profit per item is small.

clerks, keep down their overhead and turn over stock several times a year. This is true despite the fact that many people advocate large stocks with the consequent of quantity discounts. It is true in any line of business and the automobile accessory manufacturer prefers to do business with retailers in this class. They offer a constant source of profitable outlet for his business, the risk of loss is small and owners of these stores do not demand as much as do the proprietors of the larger stores.

The manager of an accessory store that is large enough to employ several



Window Dressing is an Art, as Evidenced by These Four Windows and Those on Opposite Page. The Figures at Upper Left Grip the Attention, While the Placard Accentuates the Appeal. The Illustration, Lower Left, is a Straight Study in Contrasts. Upper Right Depends on Articles Displayed to Back Up Interest Created by the Placard. The Lower Right Attracts Definite Concentrated Attention by Using a Very Few Articles, Attractively Displayed.

aged close to \$2000 yearly. The business was clear and he had built a small house, which was bringing in a very desirable rent.

The elder brother was not satisfied, however. He wanted to do big things in a big way and eventually the two partners separated, the younger buying out the other, who immediately started organizing a much larger company in the same city.

The newly started business was successful enough, but here is the point of the story. At the end of two years the two brothers met and compared notes. The actual figures for the previous year showed that the smaller store had done a gross business somewhat smaller than the bigger establishment, but the net profits of the little store were actually larger than the other.

The bigger store had carried a very large assortment of accessories, many of which had not sold well, whereas the small establishment, having little room for any except quick-moving articles,

Take as an instance the Ford wrench sets that one sees in nearly every accessory store. Assume that the dealer's original investment in this item had been \$200. Suppose these wrenches bring in a gross profit of only 10 per cent. They will sell in such volume that at the end of the year the dealer may find that he has had to replenish the stock 10 times, thereby making a very substantial net profit on the original investment. Now suppose the dealer also has a stock of parts for a very expensive make of car. His original investment is perhaps \$300. The gross profit is 20 per cent. High grade cars seldom require new parts. During the run of the year he may sell only \$150 worth of this class of merchandise. This means that he has actually lost money on the investment and a careful summing up of his net profits will show that this is so.

Actual figures show that the most successful stores, from the viewpoint of proportionate net profits, are those that buy in minimum quantities, hire only a few

people makes a mistake if he tries to do detail work himself. He may make money by constantly keeping his nose to the grindstone of business. If he does it is simply because he is a good guesser, for the reason that unless he watches his business from every standpoint he cannot be in a position to actually know what is going on.

The true business man knows every phase of his business. He can tell you instantly just what articles sell best. He knows what accessories do not yield him a reasonable amount of profit. He knows what stock he has on hand from week to week and he also knows which clerks are making money for him.

He naturally loses perspective when he tries to do everything himself. Interested in the actual detail work he is doing he loses sight of the truly big things, and if he adheres to this method will lose track of his business to a marked extent.

He should step back and review his business from the standpoint of a total



**Attractively  
Arranged Win-  
dow Showing  
Different Tap  
and Die Outfits  
That Can Be  
Used by Motor-  
ists.**

stranger. Frequently he will find that he is the most wasteful man in the shop. For he is spending his time on petty things. The successful accessory dealer must do business by business methods. He should employ a bookkeeper just as soon as the business warrants it and should see to it that the bookkeeping department is ably staffed at all times. A good accounting department is absolutely necessary. Guesses don't go in business.

Strictly speaking, automobile parts may not be classed as accessories, but the accessory dealer should handle a fairly good line of the smaller parts, as he is bound to have many calls for them. This line could include small springs, nuts and bolts, cams, rollers, timer cases, petcocks and any other small parts that the dealer can sell in his territory. Automobile parts are really seasonable and the dealer not possessed of first hand knowledge of this end of the business should go carefully when ordering these supplies as there is nothing so dead as an automobile part that is obsolete. It's a poor investment for any dealer.

#### How to Handle Miscellaneous Stock.

The best way in which to handle a miscellaneous stock of small parts is to have a sample of each displayed in a large case at the front of the store where it will be seen by the customer as he comes in at the front door. All of these items can be numbered by the manufacturer's number and the stock can all be kept in numbered bins arranged along the shelves. Thus when one item gets low the clerk who notices it can simply write the number down on a "want book" and the dealer, by consulting the book each day, can see just what stock he should reorder from the dealer or take out of his warehouse.

In selling parts the numbers should be used as much as possible so that the clerks will become familiar with them. The average customer buying a part will call for it by the number which the manufacturer places on it. These numbers are also good to use at inventory taking as they save a lot of time and trouble in getting out a correct inventory list.

Extra stock parts on hand in the warehouse can be kept track of by means of a card file on which all the stock is numbered. Thus when the want book shows that the shelf stock is getting depleted

the dealer, by a quick reference to the card file, can easily tell whether he has other surplus parts on hand.

The best way for a dealer to decide just what stock he should carry is to carefully consider the territory he is serving. Naturally, if the lower priced cars predominate, such as might well be the case in a mill town, he should plan to stock accessories and small parts for this type of machine. This phase of the matter can only be fully determined by experience. Therefore it is unwise for the man contemplating entering the business to plan to stock up to any great extent until he is fairly certain just what articles will sell best.

The main thing to bear in mind is that he can only be successful by turning over his stock with great frequency and this means that slow selling articles should not be too heavily invested in regardless of whether they offer what appears to be a tempting profit. Nimble nickles are far better than slow dollars in the accessory business.

**The Attention  
of the Passer-  
By Is Grippped  
by the Arrows.  
He Next Reads  
the Placards  
and Then Stud-  
ies Each Separ-  
ate Tool.**



#### MAY MERGE NEW YORK AUTOMOBILE SOCIETIES.

The merging of the New York State Federation with the New York State Motor Federation was forecast at a meeting just held at Rochester. A committee is completing details of the plan to be presented later.

The convention went on record as advocating the elimination of grade crossings and enforced automobile liability insurance.

The following officers were elected: President, Thomas H. Bennett, Oswego; vice presidents, Leonard H. Searing, Auburn; Charles K. Bennett, Utica; Dr. W. G. Fish, Ithaca; treasurer, Fred J. Shirley, Seneca Falls. The secretaryship is filled by direct appointment of the president. The incumbent is Harry E. Lavier, Syracuse. President Bennett appointed George H. Cobb of Watertown, counsel, subject to approval by the executive committee. Both Syracuse and Oswego seek the convention in 1922. Decision will be made later.

#### REPORT STEADILY INCREASING SALES.

The Parish & Bingham Corporation reports steadily increasing sales from the beginning of the new year.

Total volume of sales for the four months ended April 30 last, was 41.14 per cent. of sales for the corresponding period of 1920. The plant has been operating daily since the middle of January and maintained during the four months this year an average of 24.53 per cent. of the men employed the first four months of 1920.

Releases schedule for production in May are considerably in excess of \$600,000 and additional releases are being received continually.

The Parrish & Bingham Corporation is located at Cleveland, O.



## Authoritative Summary of the Automotive Situation

President Bizallion of the Gotham National Bank, which handles more retail automobile accounts than all other New York banks combined, writes the following letter to the National Automobile Chamber of Commerce in which he offers some comprehensive and constructive thoughts of timely interest. This letter should be read by every person connected with the automotive industry, as it is a summary that has been carefully thought out by one of the few men who is in a position, through experience and first hand knowledge, to know every phase of current conditions in connection with the business of merchandising automobiles, and as such can be applied to all branches of the business.

THE GOTHAM NATIONAL BANK,  
New York.

June 25, 1921.

Mr. Alfred Reeves, General Manager,  
National Automobile Chamber of Commerce,  
366 Madison Avenue,  
New York.

Dear Sir:—

As we handle more automobile merchants' accounts than all other banks in New York combined, we are deeply interested in the continued prosperity of the retail automobile business. This interest is very direct in that many of these dealers have been our customers for the past 10 years.

Price adjustments in the automobile business, the same as in other lines of industry, were inevitable and we are very glad to see that these adjustments came in much more orderly fashion than they did in other industries. According to your price lists all the readjustments seem to have been accomplished except for a few announcements that I understand will be made around July 1st. The object of this letter is to learn whether you have any assurance from manufacturers that all price readjustments shall be made by July 1st, so that the public will realize that the new prices are to continue over a substantial period.

Would it not be well to suggest to all manufacturers that while no guarantee may be necessary, it would seem highly important to the prosperity of the retail trade that manufacturers endeavor to prove to the public that the present prices are excellent values, that in some cases they are made at a substantial but necessary loss during the readjustment period, and that for these reasons no further changes may be expected unless they are upward?

**Bankers Respect Industry and Have Been Liberal With Credit. No Losses in 10 Years of Financing Automobile Dealers.**  
During the past few years the banking

fraternity has been led to look upon the automobile industry with the greatest respect, not alone because of its volume, but because of the energetic manner in which it has been conducted and our high appreciation that cars and trucks are now permanent necessities in our American life. Banks generally have been liberal with their credits to the industry, curtailment coming only in a few districts and in a few cases where the dealer was not entitled to credit, irrespective of the product he was selling.

We take pride in the fact that in 10 years of financing automobile dealers to the extent of many millions of dollars, we have never had a dollar's loss except in one instance where fraud was committed.

### Survey Shows Substantial Purchasing Power—Stabilized Prices Needed.

Our interest in the retail selling field has led us to make a survey which shows:

1. That there is a substantial purchasing power available for motor cars in particular, and to some degree for motor trucks, particularly in connection with new building operations that are now getting under way.

2. Buyers generally are waiting for the final adjustment of motor car prices, to be assured that when they do buy the price will not change a few weeks later.

3. It is the hope among dealers that all manufacturers who contemplate price adjustments will do so promptly and with the full understanding of the requirements of the next six or eight months.

4. While guaranteeing prices may have many bad features, the makers should endeavor to impress the public with the new values in motor cars and to show that the industry has now been stabilized after these mid-season price changes, that no more changes are probable and, moreover, that if there should be any further price changes it would

more than be offset by the reduced value of the car which the average buyer now has to trade.

### Believes New Prices Represent Extraordinary Values in Motor Cars.

From our survey of the field it would appear that the new prices represent extraordinary values in motor cars because they are so little above the pre-war prices, to say nothing of the fact that many of these new models are better equipped, better made and better finished than the products of five years ago.

While I appreciate the difficulty of concerted action by nearly 200 manufacturers of motor cars and motor trucks in an industry as big as yours, the National Automobile Chamber of Commerce has been such a constructive force for so many years and the automobile industry is in so much better shape than the majority of trades in this country, that I hope your organization will undertake to convey to its members some of those things which I am prompted to suggest because of our high interest in the motor car sales in the eastern territory.

### Asks Whether Manufacturers Can Give Assurance of Continuation on Present Basis.

Can you, or through you, can the manufacturers give us any assurance of a continuation of operations by the manufacturers on the present basis of prices and values? Some certainty along these lines will materially help the dealer in his plans for maintaining his organization and sales work that would permit broader plans for financing his requirements on the part of banks and ultimately be for the best interest of the public, the manufacturer and the retailer.

Please be assured of the readiness of our bank to render every possible assistance in the solution of this problem for further stabilization of the automobile industry.

Yours very truly,  
(Signed) H. H. BIZALLION,  
President Gotham National Bank.

### PROPOSED MANUFACTURE OF GASOLINE SUBSTITUTE.

Penrol, South Africa (Ltd.), is marketing 85,000 shares of stock in order to secure initial working capital for the production and marketing of "Penrol," a gasoline substitute. This new fuel will be made principally from alcohol, which will be produced from locally grown maize or mealies (corn). It has been patented in the Union of South Africa and its name registered. The advantages claimed are as follows: It can be manufactured in South Africa solely from ingredients and constituents produced locally; the selling price will be considerably below that of

gasoline; in power and driving force it is practically equal to gasoline; it has no smell and does not carbonize; it is non-corrosive, smokeless and stainless. Penrol has been subjected to trials and experiments for a considerable period in motor cars, motorcycles, motor trucks and air planes over a distance of 10,000 miles with excellent results, according to reports from experts and leading firms in the motor trade in this country. The total gasoline consumption of the Union of South Africa is estimated at 12,000,000 gallons annually, but the total for the past year was only about 11,000,000 gallons. By-products of cattle feeds and other lines are also contemplated.

### CARE IN APPLYING BRAKES.

The brakes should not be applied too suddenly when driving on wet pavement, as such action is liable to cause a bad skid. In such a case turn the steering wheel in the direction of the skid; at the same instant release the brakes. Better control will result if the brakes are applied gradually on and off. Some drivers lose their heads in such an emergency and feel that they have done everything possible when they have locked the brakes. Do not permit the driving wheels to slide either in starting or stopping. Gradual clutch and brake engagement will avoid this.

## New Head Light Regulation in Massachusetts

THE new rules and regulations concerning head lamps on motor vehicles in Massachusetts have been announced by the state registry department, as well as the approved list of

ter 90 of the General Laws as amended. All motor vehicles operated on the ways of Massachusetts, during the period from one-half an hour after sunset to one-half an hour before sunrise, shall be equipped

### APPROVED HEADLIGHTING DEVICES.

Name of device	Adjustment	Aim of beam
Bausch & Lomb.....	1.....	3" down at 25'
Brown Reflector.....	Special.....	Lamp front vertical
(Adjust for narrowest vertical spread)		
Conaphore Type F (colorless glass).....	1.....	6" down at 25'
Holophane No Tilt.....	1.....	Horizontal
Lee Knight.....	1.....	4½" down at 25'
Legalite M III.....	1.....	Horizontal
Liberty Type D.....	1.....	Horizontal
Macbeth Type D.....	1.....	Horizontal
Patterson.....	1.....	Horizontal
Universal.....	1.....	6" down at 25'
Wills-St. Claire.....	1.....	Lamp front vertical
Mirror beam 6' down at 25'		
Alpheco.....	1.....	Horizontal
Bi-Optic.....	1.....	6" down at 25'
Holophane.....	1.....	Horizontal
Liberty.....	1.....	3" up at 25'
National.....	1.....	6" down at 25'
Primolite Type B.....	1.....	Horizontal
Syndicate Type A.....	1.....	Horizontal
Violet Ray.....	1.....	6" down at 25'
Saferlite.....	2.....	6" down at 25'
Shaler Roadlighter.....	2.....	6" down at 25'
Fractolite.....	Special.....	Horizontal

\*See manufacturer's instructions.

"Approved devices are marked as indicated above with the name in full. Special attention is called to the fact that the Macbeth lens is not legal unless the name 'Macbeth Type D' is molded in the glass; the Legalite lens is not legal un-

less the name 'Legalite M III' is molded in the glass; and the Conaphore is not legal unless it is made of colorless glass and has the name 'Conaphore Type F' molded in the glass."

head light lenses or devices required to be used. The new law, which is as follows, goes into effect Aug. 15:

Section 1—If and when, during the period when motor vehicles are required to display lights there is not sufficient light within the travelled portion of the highway to make clearly visible all vehicles, persons or substantial objects within a distance of at least 160 feet, no automobile shall be operated unless it is equipped with two lighted head lamps of approximately equal candle power, which shall throw sufficient light ahead to make clearly visible all vehicles, persons or substantial objects upon the roadway within a distance of 160 feet; and no motorcycle shall be operated unless it is equipped with one head lamp which shall throw sufficient light ahead to make clearly visible all vehicles, persons or substantial objects upon the roadway within a distance of 115 feet.

Section 2—Every lens or other device designed to prevent glaring rays, the use of which on motor vehicle has been approved by the registrar, shall be applied and adjusted in accordance with the requirements of the certificate approving the use thereof. Every lamp bulb or light used in any head lamp on a motor vehicle shall be of 21 mean spherical candle power. Every reflector which is used as a part of such head lamp shall have a highly polished silvered or glass reflecting surface and shall be free from dents, rust and other imperfections.

Section 3. The operator of every motor vehicle shall permit any police officer or motor vehicle investigator and examiner to inspect the headlighting equipment of such motor vehicle and to make such tests as may be necessary to determine whether the provisions of section 2 are being complied with.

Herewith is the approved list of headlight lenses or devices required under the provisions of section 7 of chap-

with an approved device, excepting that motor trucks of carrying capacity of two tons or over equipped wholly or in part with hard rubber tires may display acetylene lamps equipped with a lens or device designed to prevent glaring rays, to be approved at a later date.

### FORD'S RIVER ROUGE PLANT IS AN INDUSTRIAL WONDER.

Ford's new River Rouge plant is one of the industrial wonders of the world. Not only is it the largest plant of its kind now, but it is being so developed that it will have almost unlimited possibilities for the future.

Today it is the crowning achievement of the automotive industry.

Even the people in Detroit hardly realize the extent to which Henry Ford has developed his River Rouge properties. The plant already spreads over 356 acres and within three years it will cover 1000 acres, with a total cost of about \$70,000,000. The plant is located on the River Rouge, five miles below the center of Detroit.

Detroit's entire industrial development is being redirected as the result of Ford's Rouge activities. The government is dredging the river in a manner that will add eight miles to the city's dock facilities. Ford is employing water transportation to the utmost in his plans. Ships from his ore and timber lands will be able to unload directly at the plant. Ford's railroad also taps the new plant, and over it he receives coal and sand from his own properties.

Regardless of certain questions con-

cerning the economic wisdom of this gigantic development, the fact is unchallenged that at the River Rouge is taking place one of the industrial marvels of American history; an undertaking that, when completed, will give employment to 60,000 men.

At the River Rouge the whole series of costly steps between first melting of the ore in blast furnaces to pouring of refined steel into cast parts has been eliminated. Metal is melted but once. While molten, it is purified, mixed with desired alloys and cast for the first and last time into the desired part. When the metal is released from blast furnaces it is gathered in caldrons and carried over tracks to another furnace, where it is mixed with alloys. It is then run into smaller ladles, taken to the foundry and poured into automobile and tractor parts. Molds are carried on an endless chain in the foundry past a man with a movable ladle, who operates machinery that pours the metal into the mold. The mold is carried along the line to be cooled and finally broken open to release the part. When the plant is completed there will be 20 of these endless chains carrying molds. One blast furnace is now in operation. Three more are being constructed. Four others are planned.

There are now in operation 122 coke ovens, each with capacity of 15 tons of coal. The ovens produce daily from the coal 1700 tons of coke, 18,000,000 cubic feet of gas, 4000 gallons of benzol, 16,000 gallons of tar and 20 tons of ammonium sulphate. Benzol is sold to the public as a motor fuel. Gas was formerly disposed of for general use in Detroit, but pipelines have been constructed to Highland Park, 10 miles away, and it is there used as a fuel. The present battery of ovens will be duplicated.

A number of interesting economies are noted at the plant. Blast furnaces are hooded, and gases arising in that process are led to the power house for use as fuel. Every exhaust pipe is hooded and the steam used in heating or condensed for the boilers. Boilers develop 26,000-horsepower and are said to be another of the "largest in the world features" of the plant.

Though far from completed the River Rouge plant already turns out 250 tractors and 500 tons of pig iron a day. It is said the Fords will later market metal on a considerable scale.—The Gargoyle.

### REMOVAL OF NEW DEPARTURE'S CHICAGO OFFICE.

The Chicago sales office of the New Departure Manufacturing Co., whose factory is at Bristol, Conn., have been moved from 2721 South Michigan avenue to the People's Gas building, 122 South Michigan avenue.

### PARO PURCHASES GREASE PUMP CO.

The H. C. Paro Co., 1412-14 South Michigan boulevard, Chicago, Ill., has purchased the entire stock and patents of the Grease Pump Manufacturing Co. and the consolidated organization will hereafter be known as the H. G. Paro Co.

# NOTES OF INDUSTRY AND TRADE

## Maxwell-Chalmers

### Sales Directors

Announcement is made by Arthur E. Barker, vice president and general sales manager of the Maxwell Motor Corporation, of the appointment of John J. Plath as director of sales of the Maxwell Motor Sales Corporation and E. W. Clark as director of sales of the Chalmers Motor Car Co.

Mr. Plath's connections with the Maxwell companies dates back to 1913. Starting in as district supervisor, he was soon placed in an executive position, became assistant director of sales and has held that post up to his recent promotion.

Mr. Clark's service with the Maxwell and Chalmers companies also extends over a number of years. While he has served as assistant treasurer for some



John J. Plath, Director of Sales, Maxwell Motor Sales Corporation.

time his original work with the company was entirely in the development of territory and promotion of sales.

### CHAMPION PLUGS AT INDIANAPOLIS RACE.

It is stated that the Champion Spark Plug Co., Toledo, O., had a part in the victory of Tommy Milton at the recent 500-mile race at Indianapolis, as spark plugs from the Toledo factory were used by Milton in Louis Chevrolet's Frontenac eight, which averaged 89.62 miles an hour for the five-century grind.

Ellingboe, who finished third, in another Frontenac, also used Champions.

Both of these winners ran the entire race without changing a spark plug.

### CHEMISTRY AS AN AID TO AUTOMOTIVE INDUSTRY.

Recognizing the growing importance of the automotive industry, special atten-

tion will be given to its requirements at the Seventh National Exposition of Chemical Industries which will be held the week of Sept. 12 in the Eighth Coast Artillery armory, Jerome avenue and Kingsbridge road, New York City. This is the same building in which the last motor truck show of the National Automobile Chamber of Commerce was held.

The subject of dyes is a matter of vital interest to the automobile producers, since the enduring qualities of body coloring, and upholstery or dye, mean so much to the looks of a car after it is some months old. Enamels, paints and processes will be displayed in great profusion at the exposition and illustrated lectures on the subject will be given by experts. Members of the Society of Automotive Engineers will participate in the symposiums that will be held.

Fuel and substitutes for gasoline naturally are of interest to automotive men and the lectures and demonstrations that will be part of the show are certain to be of value. Recent discoveries in the manufacture and use of low-test fuel will be of interest to engineers. Likewise, many new metals and alloys suitable for the manufacture of pistons, crank cases, piston rings, tire processes and other parts will be on view. The ever-present American question of efficiency, waste elimination and perfection of production will find its solution in the latest discoveries of chemistry.

There will be more than 450 exhibits in the exposition and these will cover five city blocks of space. Programme of papers and addresses by speakers of note will be given in an auditorium equal in size and comfort to any of the big city theaters. The talks will consist of a series of symposia on chemical engineering and other topics of keen interest to scientists and industrial men. Motion pictures will be used to illustrate the operations.

British and Canadian chemists will be represented by delegations sent especially to look over the progress in American chemistry, while South American countries will also send representatives.

### TRAIN-LOAD SHIPMENT OF HAYNES FIFTYS.

The largest single shipment of Haynes automobiles that ever entered Pittsburgh, Pa., consisting of a 50-car train load of 100 Haynes Fiftys, the smaller and lighter Haynes five-passenger, six-cylinder touring car, was dispatched recently from the Haynes Automobile Co., Kokomo, Ind., to George M. Evans, Coulter Motors, Inc., Haynes distributors at Pittsburgh.

The Pittsburgh order is the fifth one for train load shipments, each consisting of a minimum of 100 cars, within the past two months. On May 5 a special train load of 150 Haynes Fiftys was dispatched to New York and two weeks later came San Francisco's telephone order for 150 Haynes cars.

## Hupp Motor Car

### Co. Prosperous

Following the declaration in June of a regular quarterly dividend of \$1.75 on its preferred stock, the Hupp Motor Car Co., Detroit, Mich., has also declared its regular quarterly dividend of 25 cents a share on the common stock, payable Aug. 1 to stockholders of record July 15.

According to a statement made when the dividend was declared, the company has cleaned up the last of its bank loans, and now has no debts except current bills, and it is stated that although it had its share of high-priced materials at the close of 1920, inventory has been worked off and the company is now purchasing for present consumption.

It is also stated that the recent reduction in the price of the Hupp car has helped to stimulate this year's sales



E. W. Clark, Director of Sales, Chalmers Motor Car Co.

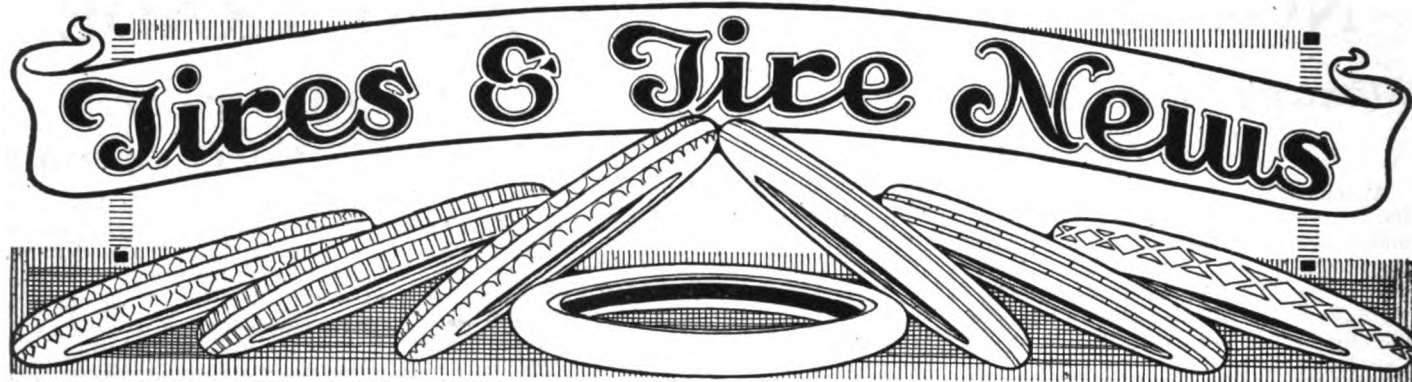
throughout the country, so that its operations are now close to normal, being at the rate of approximately 2000 cars monthly.

### REDUCTION IN PRICES OF KLAXON HORNS.

In line with the downward trend of automobile accessory prices, the Klaxon Co. of Newark, N. J., has announced a price reduction on all Klaxon horns. These decreases range from \$3 on models 12-L and 12-S to an average of 75 cents on the Ford models.

Models 20-L and 20-3 are reduced from \$32 to \$30.

The new prices went into effect June 25. Push buttons and wires are to be furnished only with the Klaxon 20 hereafter, this extra equipment costing 75 cents list with Klaxon models 6, 6-deck, 6-MC, 5 and \$1 list with models 12-L and 12-S.



## **Fisk Automotive Office Building**

The new Fisk building at Broadway and 57th street, New York City, which has been in process of construction for the past year for the Fisk Rubber Co., whose factory is at Chicopee Falls, Mass., was recently dedicated and is now being occupied by various automotive industries who have been desirous of securing proper headquarters in the heart of the metropolitan automobile district.

The new Fisk building occupies all of the southerly West 57th street block front between Broadway and Eighth avenue, replacing two historic apartment

house structures. This building is 25 stories in height and is the tallest north of the Times square section. The estimated cost of the building, including the land, is reported to be between \$7,000,000 and \$8,000,000.

The architects were Carrere & Hastings and R. H. Shreve and the construction work was by Fred T. Ley & Co.

The Fisk Rubber Co. has commodious executive offices in the new structure and the remaining office space is in the hands of the Cross & Brown Co., 18 East 41st street, for rental purposes, etc.

It is needless to say in regard to the new Fisk building that every appointment and every feature of equipment is provided to give service of the highest character. No office building in the Me-

topolis can offer more in way of luxury and convenience. The floor plan is unique in that on account of an unusual frontage of 400 feet on three streets, each 100 feet wide, a design has been possible whereby less than six per cent. of the area on each floor is further than 30 feet from an outside window.

Its proximity to adequate transportation facilities is also worthy of mention, as it is within 900 feet of stations of the Interborough subway, the Elevated lines and the B. R. T. subway from Brooklyn through downtown Manhattan to 57th street and across to Long Island City. It is equally accessible by motor, Fifth avenue bus or other transportation.

The construction of this immense office building, through the initiative and energy of the well known Fisk Rubber Co., is a marked illustration of the rapid transformation of New York's 57th street from a residential section to a business thoroughfare.

### **PRODUCTION INCREASING IN TIRE FACTORIES.**

Production of tires in the Mason tire factory at Kent, O., is now running at 1500 a day. About 90 per cent. of the entire production is cord tires. Sales for May were in excess of May of last year. More men are being employed than ever before.

The Firestone Tire and Rubber Co. has increased its production to 21,000 casings and 23,000 tubes a day, approximately at a prewar normal level.

The Miller Rubber Co. has attained an output of 4500 tires a day.

Business coming from every section of the country, except the South, occasions the increases. Buying has been resumed on a large scale in the West, where it has been slow.

### **INDIA RUBBER CHANGES NAME.**

In accordance with a recent favorable vote of the stockholders of the International India Rubber Corporation, South Bend, Ind., the board of directors has announced the official change of name to the Odell Rubber Co. This change in nomenclature will in no way affect the business of the company, merely fulfilling a desire for a shorter, more euphonious name conforming to the trade name of the principal product of the company, Odell cord tires.



Mammoth New Office Building in New York City Built for the Fisk Rubber Co.



## Carburetor Should Be a "Good Mixer"

**T**HE carburetor has been tritely but truly styled the heart of the automobile. It is at this point of the engine mechanism that raw gasoline and air are properly mixed and in many instances heated, and drawn into the combustion chambers, where it is used as fuel to operate the engine. While other components enter into the successful mixture and use of gasoline, the carburetor will be especially treated at this time.

The carburetor, in the early days of automobiles, was called a mixer, and this name still holds in some quarters, although it has in recent years become generally known as a carburetor, however, performing similar duties to the old mixing valve.

Have you a good mixer on your car?

It does not matter how good a mixer you are politically or socially, if there is not a good mixer on your automobile, it spells trouble. Call it a carburetor if you will, but its business is mixing, for, though it be one of the most complex devices in use, with all sorts of valves and levers and controls, the whole centers around the mixing chamber, where the gasoline and air are manufactured into a combustible mixture. The rest of the apparatus is simply to see that proper proportions and conditions exist in that royal chamber.

Now, if the reader has not made a study of the instruction book for his particular brand of carburetor, he should get it out, read it through and find out just how this important component works. If you can visit a service station where they can show you a sectional model of your style of carburetor and explain its workings, so much the better.

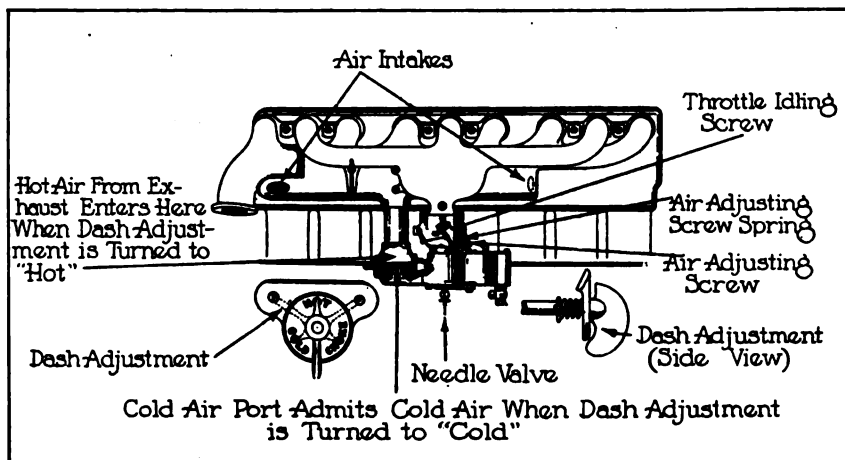
The first thing to learn about a carburetor is to let it alone. So many new drivers want to adjust it every time the engine sputters. Since it is the lungs of the engine, it is natural that there should be a cough at times. But cough and sputter and gasp do not mean necessarily that the carburetor is at fault or out of adjustment. If it has been working well and you and your friends or the

garage man have kept hands off the adjustment, you can gamble that it is correct still. It takes fingers to change it.

### What Is the Proper Adjustment?

Of course the proper adjustment is that which gives the greatest power for the smallest gasoline consumption. If too little gasoline is admitted to the mixing chamber the mixture will be lean and the engine will backfire, especially in starting; if too much gasoline, the mixture will be too rich, causing sluggish action of the engine and probably black smoke from the exhaust. Blue smoke indicates too much lubricating oil and it is steam when it is white; black smoke indicates but one thing, an over-rich mixture.

There are two parts to the adjustment of the carburetor. The needle valve controls the gasoline supply. This usually has a small wheel or knurled button for adjusting, with a movable pointer to indicate the position. Turning the wheel or button to the left gives more gasoline and vice versa. Before changing the adjustment set the pointer in such a manner that you can change back to the present adjustment if desired. Then close the needle valve wholly by turning to the right and notice how many turns it takes.



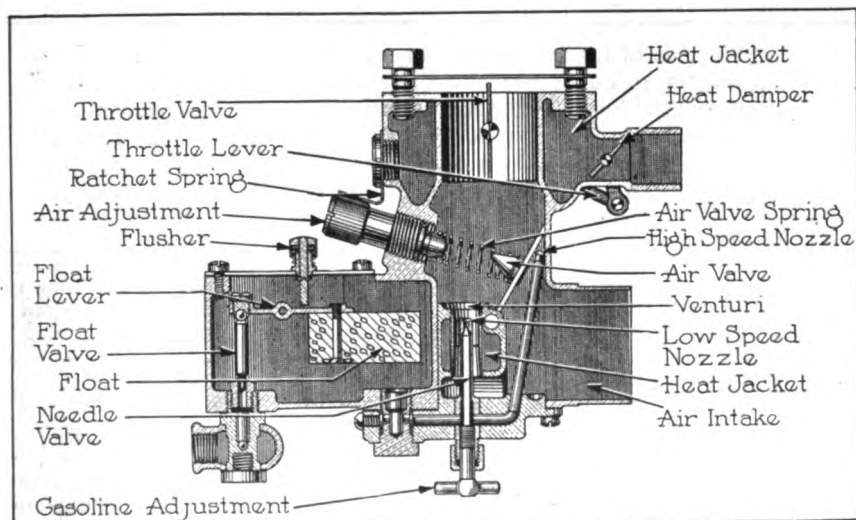
Showing Relation of Carburetor to Intake Manifold and Dash Control.

Open the needle valve about three-fourths of a turn and see if the engine will start. If so, does it run smoothly or is there a lot of fuss about it? If smoothly, press the accelerator sharply. Was there a quick response from the engine, indicating pep? If not, open the needle valve a hair's breadth and test again and continue until the adjustment is such that there is smooth idling and a sharp response to the throttle or accelerator. The correct adjustment is the least opening which does not cause backfiring. Since there is variation in all makes and all models of carburetors, adjustments should be made with the instruction book in hand until you know all the processes for your make.

The auxiliary air valve adjustment must be made when the car is running. It may be set approximately when standing, but when you see the garage mechanic leaning over the engine when running he is tuning the auxiliary adjustment to a nicety. Perhaps you would rather let him do this acrobatic work, but if you are to learn the car you must try it, too. Economy of operation depends upon care in carburetion.

Many service stations in the larger cities have a carburetor specialist whose sole duty is to diagnose carburetor troubles and remedy them. His duties are varied in this line and oftentimes what seems to be a carburetor trouble is traced by him to some other component of the engine.

Some of the extraneous troubles that these experts find which give the carburetor a bad reputation are: A clogged gasoline feed pipe, which allows some gasoline to flow, but not enough; a leaky float valve in the vacuum tank, a broken inlet valve, a loose inlet valve spring, a leaky inlet manifold; in short, a great variety of ignition troubles which seemed to reflect on the carburetor, such as worn piston rings and others gummed fast in their grooves, disturbing the compression; valves which need grinding in, leaks about spark plugs, valve caps and priming cups. Still others could be added and the list would not be complete, but by righting these such a specialist will re-establish the reputation of many a good carburetor.



Modern Carburetor Showing Parts and Necessary Adjustments.

# Bureau of Public Roads Engaged in Highway Construction

**TOTAL MILEAGE TO BE BUILT BY FEDERAL AID NEARLY SUFFICIENT TO ENCIRCLE GLOBE—MANY KINDS OF ROAD SURFACES USED IN PROGRAM THAT WILL DO MUCH FOR FUTURE OF AUTOMOTIVE INDUSTRY.**

**O**F THE 22,030 miles of federal aid roads which have been built or are now under construction, more than two-thirds are earth roads, sand clay, or gravel, says the chief of the Bureau of Public Roads, United States Department of Agriculture. These have cost less than one-third of the total amount expended, as compared with nearly 50 per cent. of the estimated cost applied to 4890 miles of hard surfaced roads. A study of local conditions by an engineer of the bureau is necessary before a road project may receive federal aid.

The type of road to be used, and the most suitable surface with respect to the traffic of the locality must be determined. Service must be satisfactory, while costs must be kept low, both for building and maintenance. There must be a careful analysis both of the engineering and economic conditions for each particular project. There are individual considerations in every case which affect the determination as to the best type of road materials for that locality.

The mileage of federal aid roads which

## HELP BUILD 22,030 MILES OF HIGHWAY.

On June 1 of this year 22,030 miles of highway, extending into every state, had been completed or were in process of construction, at a total estimated cost of \$361,946,868. The percentage of this total estimated cost which will be incurred for each type, and the mileage of each type, based upon the records of plans approved, are as follows:

### PER CENT. AND MILEAGE OF EACH TYPE OF ROAD.

	Per Cent. Total Estimated Cost	Mileage
Type 1, including earth, sand clay and gravel.....	32.2	15,300
Type 2, including water bound and bituminous macadam	9.0	1,530
Type 3, including brick, bituminous concrete, Portland cement concrete.....	48.8	4,890
Miscellaneous .....	4.0	310
Bridges .....	6.0	.....
	100.00	22,030

jects are approved which are not considered suited to the conditions to be met. Many popular fallacies exist as to road improvement, and there have been many misconceptions as to the types of

be placed as soon as funds become available. This allows the road bed to be prepared and become thoroughly consolidated before the surfacing is placed, which is highly desirable from a construction viewpoint. To follow such a course, however, is out of the question when a road is heavily travelled and some form of surfacing must be provided. To care for traffic under these conditions frequently a sand clay or gravel surfacing is provided, which will serve for several years and let allow the road to be maintained under reasonably heavy traffic.

### Use Many Kinds of Road Surface.

Granting that the preparation of the road bed has been properly done, many kinds of road surfaces will give excel-

**"It is the policy of this bureau to consider the conditions on each individual federal aid project, as there are elements such as subgrade, drainage and present and prospective traffic, which vitally affect the determination of the standards of construction to be used."**

have been built or are now under construction is nearly sufficient to encircle the globe. This is the record of work accomplished since July, 1916, when the federal government first stepped in to aid in the enormous task of building highways that are now called upon to carry more than 9,000,000 motor vehicles plus a very substantial horse drawn traffic in the 48 states.

The Federal Aid law is well named. The Department of Agriculture has given the broadest possible construction to the law for the purpose of providing the greatest mileage of highways suited to the traffic to be carried over them, at the minimum expense. An analysis by the Bureau of Public Roads of the projects under contract shows that all types of roads, from the graded earth road up to the finest paved surfaces, have been built.

The states initiate the road projects but, before federal aid is granted, an engineer of the bureau makes an inspection of the roads to be improved, studies the local conditions, consults with the state highway department and no pro-

roads on which federal aid funds may be used. Properly built earth roads, say specialists of the department, are the fundamental requirement in all highway improvement.

Regardless of the material or type of surfacing which is to be placed, the prep-

**"Types of highways should not be specified by law. This is a matter to be decided by the state highway department in which should be lodged full authority both to construct and to maintain. Competition between different types of material should be maintained and selection made to fit traffic requirements in each case. The bureau does not recommend any one type to exclusion of others."**

aration of the road bed requires the highest engineering skill and experience. The department considers that the use of adequate sums for the securing of proper location, thorough drainage, permanent bridges and culverts, and the elimination of railroad crossings is demanded if enduring improvements are to result.

Federal aid is allotted to the improvement of earth roads, but only with the stipulation that a suitable surfacing will

lent service. The element of time is important. There are so many miles of roads to be constructed, and their cost will be so enormous that the most careful and detailed study of each road project must be made to provide, at the lowest possible cost, roads which will give satisfactory service and which can be maintained without undue depreciation under the traffic which is to use them.

# ACCESSORIES DEPARTMENT

The Buell Explosion Whistle for all passenger cars and motor trucks is stated to have passed the Underwriters' Laboratories' rigid tests for efficiency, reliability, durability, etc., and has received its stamp of approval. The Buell's warning efficiency does not decrease with use, but is claimed to outlast the car. It needs no oiling, cleaning, adjusting or further attention after installation and is guaranteed by the maker for 10 years.

The Buell is capable of producing a loud, attention-compelling sound for emergencies, yet is entirely under the opera-

ideal signal. The model of the car should be given when ordering.

The accompanying cuts show the single-tone whistle with Ford plug and the Junior.

Manufactured by the Buell Manufacturing Co., Cottage Grove at 30th Street, Chicago, Ill. Literature and prices on application.

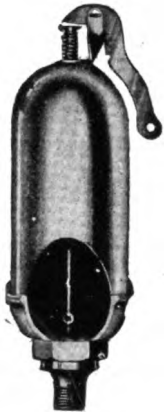
**Pedrick True-Fit Piston Rings** are claimed to offer the following distinct exclusive features:

Fit—Shaping under heat by a patented

peated tests have demonstrated conclusively that if Pedrick rings were refinished after shaping they would actually be less accurate. In other words, so perfect are these rings that some of their accuracy would be removed by the application of the identical finishing operation that is required by other rings.

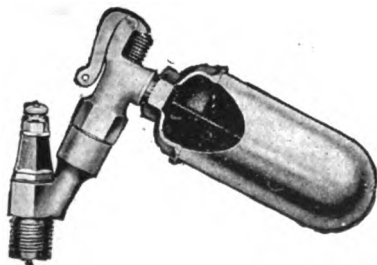
The black surface of Pedrick rings is acquired during the shaping process. Refinishing removes it. The Pedrick black finish is the guaranty of the perfectly shaped ring.

Manufactured by the Wilkenning Manufacturing Co., Philadelphia, Pa.



tor's control for moderate musical sounding. It is the acme of simplicity—a poppet valve ground to a gas-tight seat and a locomotive type whistle ball. Its installation is correspondingly simple—screw in place of a cylinder petcock. It does not deface the car nor interfere with the engine's operation, as it does not leak compression. The power consumed is negligible for the instant or two it is sounded. It is sensitive to the slightest touch on the control.

The Buell whistle is made in three sizes, but is adaptable to any sized motor. On engines not equipped with priming cups in the cylinder head and which cannot be tapped for 1/8-inch pipe opening, the



whistle is installed by welding a fitting to a standard spark plug. The cleaning action caused by blowing the whistle makes this installation quite satisfactory, especially on the Ford, giving this car an

process assures their quick and permanent fit.

**Tension**—Tested by four special methods, determining the correct tension of each ring necessary to exert equal pressure at all points of contact against the cylinder wall.

**Stress**—Uneven shrinkage in the castings sets up internal stresses, which are the cause of distortion in piston rings. The Pedrick method of manufacture removes all such stresses. They cannot possibly lose their shape or warp.

**Accuracy**—Machining limits in the Pedrick True-Fit Piston Ring factory are closer than S. A. E. specifications. They are held to one-half of .001 of an inch and are mathematically precise. This insures the true circular shape of the ring when operating in the cylinder.

**Reputation**—The fact that the manufacturers of Packard, Cadillac and other high-grade cars are using Pedrick True-Fit Piston Rings is a volume of argument in their favor.

Pedrick rings have an exact shape, which insures uniform pressure against the cylinder at all points of the circumference. Nearly all methods of shaping piston rings aim to produce this result and nearly all makers claim that their particular product is the most nearly perfect in this respect, which all concede to be by far the most important requirement of a ring.

Long experience and frequently re-

The Norlund Safety Auto and Truck Jack No. 1 is made entirely of malleable iron, the main frame and base being one solid casting. It embodies the exclusive feature of the specially designed, reinforced end pinion, which serves two purposes. First, this reinforcing of the pinion end gives the pinion abnormal strength and capacity and increases the safety factor 200 per cent, which since it must bear the actual load in lifting is most essential. Second, by reinforcing this pinion smaller teeth can be used without weakening the jack in any manner, which insures 50 per cent. easier operation. This new combination of worm



drive and pinion gear increases the effort applied on the operating crank 125 times. A child can raise the heaviest car with ease.

Speed and efficiency are insured because there is no lost motion, or non-producing effort used; the jack starts to raise with the smallest turn of the brace and continues to lift until the brace stops turning.

The Safety Nos. 1 and 2 by their unusual strength and capacity are both a passenger car jack and a truck jack suitable for anything up to 2 1/2 ton trucks.

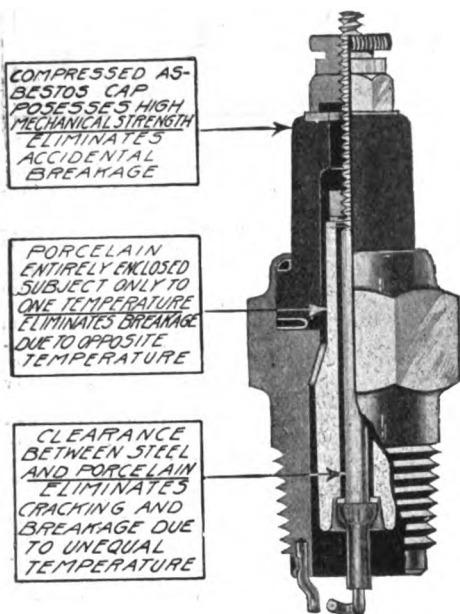
The Safety has only three working parts, the worm, the combined solid cast, a worm gear and pinion and the rack, insuring utmost simplicity and continuous service.

Manufactured by the Norlund Novelty Co., Williamsport, Pa.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The Durabilt Spark Plug** is assured by the manufacturer to possess an outstanding feature in the fact that it is "built to stand up in severest service." It is constructed with a compressed asbestos cap which possesses high mechanical strength, the porcelain is entirely enclosed and subject to only one temperature, and there is ample clearance between the steel and porcelain, all of which is said to eliminate breakage.

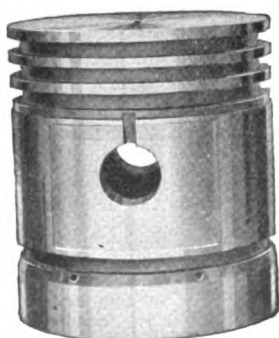
The Durabilt is made for all engines and for all classes of service, and is the product of the finest materials and workmanship. It is offered with the feeling



that a spark plug that will operate efficiently under the most adverse conditions and "stand up" is certain to give satisfaction to the user.

Manufactured by the **W. H. S. Manufacturing Co.**, 2704 Roosevelt Avenue, Indianapolis, Ind., which will supply details and quote prices.

**Spencer-Smith Precision Pistons** are made from the finest grained semi-steel, which is a more resilient and better wearing metal than the ordinary gray iron castings formerly used. This metal contains about 17 per cent. of steel, which gives it a greater tensile strength and stamina than gray iron. The Precision pistons are machined to very exacting dimensions.



The ring grooves are held to a machining tolerance of one-half thousandth of an inch plus or minus, as is also the outside diameter. The castings are thoroughly annealed before machining at 1350 degrees Fahrenheit, which produces the extreme warp in the metal and relieves it of all strain so that when the pistons are in operation there is no tendency for them to distort or warp out of round due to motor heat. All outside

diameters are ground and a relief grind is placed around the pin hole to compensate for the expansion of the metal at this point. Even where the semi-finished pistons are finished they are relief ground on a basis of .020 finish, as this



operation is deemed highly important. The majority of the Spencer-Smith pistons have a 1/16-inch side wall.

In the manufacture of service pistons, where the car manufacturer's design can be improved on this has been done. The Chevrolet is 10 ounces lighter than the factory 490 design and the Buick is seven ounces lighter than the factory-made unit.

Spencer-Smith pistons are made for nearly all the well-known cars, and it is the policy of the manufacturer to turn out in a big production way pistons for practically all cars, and to give the most complete piston service at nominal cost. The cuts herewith show pistons for Chevrolet and Buick cars.

Manufactured by the **Spencer-Smith Machine Co.**, Howell, Mich. Literature and detailed information on request.

**Rust's Detachable Luggage Carrier** is one of the most popular members of the R. M. C. line of equipment. It folds up flat when not in use, is one of the most rigid carriers made and is equally in demand by tourists, farmers, grocers and other tradesmen, travelling salesmen, campers, picnic parties and passenger-carrying busses.

It is made in four styles: No. 1 has three wings and is 44 inches long, with two small flat plates, one inch wide, bolted to each end of the running board, after which the carrier is attached in a jiffy, is very strong and rigid and folds up flat.

No. 2 is identical in construction with No. 1 except that the carrier clamps to the running board with three separate clamps. These clamps can be used for many other things from time to time. Fits all cars.

No. 3 is the same as Nos. 1 and 2 only it has four wings and is 56 inches long.

No. 4 is the same as Nos. 1 and 2, but is full brass stock, nickel plated.



The Rust Detachable Luggage Carriers should be ordered by numbers.

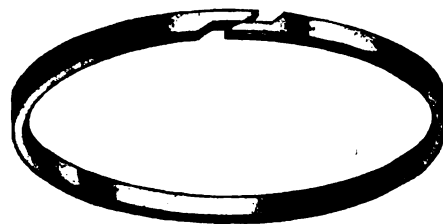
Manufactured by the **Rust Manufacturing Co.**, Works, Minneapolis, Minn.; Offices, Marshalltown, Ia. Prices supplied on application.

**Hi-Speed Piston Rings** are claimed by the manufacturer to have well-substantiated advantages on account of their diagonal and step cuts, being made of special formula gray iron and their accurate tooling.

Although the function of piston rings is well understood by every mechanic, their importance is often overlooked from their seeming triviality.

As a matter of fact there are no parts more important. The efficiency of the motor is determined by its compression and compression is not attained unless explosions are sealed in by gas-tight rings.

**Hi-Speed Piston Rings** are the ideal replacement rings because they combine, at minimum cost, every necessary principle of engineering. Being made of a special grade of gray iron they can be tooled down to .001 in accuracy. The step cut is as nearly gas tight as human ingenuity can devise. The diagonal cut compels Hi-Speed to travel slowly around the piston, thus eliminating the serious objection to other rings that score and wear cylinders out of round.



Motors apparently ready for the scrap pile are stated to have been brought back to high efficiency and economy by the installation of Hi-Speeds. This is due to the fact that besides sealing the compression they also prevent the formation of carbon, and the burning of oil in the crank case and at the same time intensify carburetion.

Hi-Speed Piston Rings are made by a concern which manufactures piston rings exclusively and has a very large plant equipped with specially designed automatic lathes and boring mills. The production runs into many thousands a day.

Manufactured by the **Continental Piston Ring Co.**, Memphis, Tenn.

**The Rex Jack** handles all types of cars easily and quickly. It is a strong, sturdily built jack, made entirely of heat treated steel and malleable. It rolls into position on four strong wheels, making operation extremely easy.

The Rex is safe because when the jack is fully extended, the weight is evenly distributed over four points. One stroke of the handle lifts the jack to its full height. Three distinct heights are available without using the extension.



The Rex locks automatically at all heights in raising and lowering. The design and construction make this a practically indestructible jack.

The specifications are as follows: Collapsed height, 5 1/2 inches (extremely low for a service jack); extended height, 20 1/2 inches; capacity, 1 1/2 tons; weight, 47 pounds; wheelbase, 12 inches; width, five inches.

Manufactured by the **Zim Manufacturing Co.**, 208 North Wabash Avenue, Chicago, Ill. List price, \$20.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



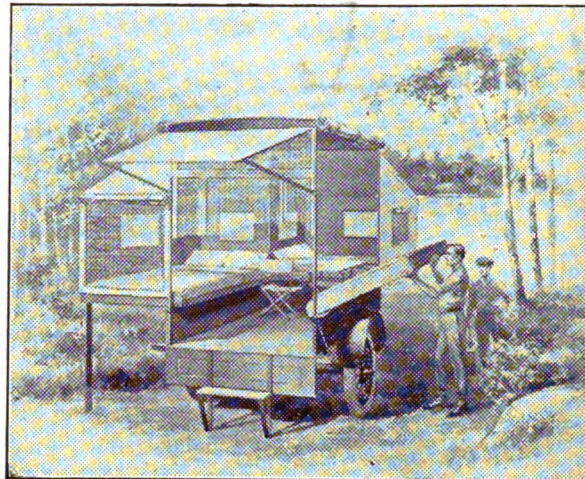
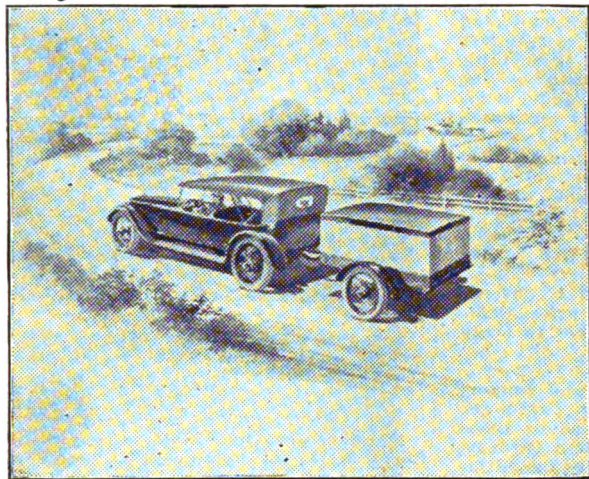
The Lyons Camp Bungalow Trailer is one of the most practical camping outfits on the market. It is built in four units. First, the top, which is of the regular express type, made of wood laths and covered with extra strong black duck mate-

and three feet wide, and can be removed by simply taking off two set screws.

The sides of the roof and ends of the left and right units are made with solid wood frame and laths covered with automobile top material, best quality, with

Wood flooring with steel protecting strips. High grade auto springs, 750 pounds capacity. Dark green body, black wheels.

The following equipment may be added: Folding stools, folding chairs, lounging chairs, folding tables, gasoline stoves,



rial. The top is put on collapsible posts. Both of the curtains on the top are removable and used buttoned together as a fly in the rear of the camp bungalow when the camp is set up.

The other unit is the left bed unit, containing bed, spring and mattress. This folds to nine inches thick, six feet long

window screens and curtains for weather protection. The child's bed unit is the same construction.

Specifications—Steel body, 72 inches by 46 inches, 12 inches deep 30 by three wooden automobile wheels, ball bearing; 1 1/4-inch axle, 30 by three non-skid pneumatic tires, standard American make.

kerosene stoves, sterno stoves, camping dishes and utensils, folding bath tubs, folding wash stands, folding water carriers, ice chests, provision boxes.

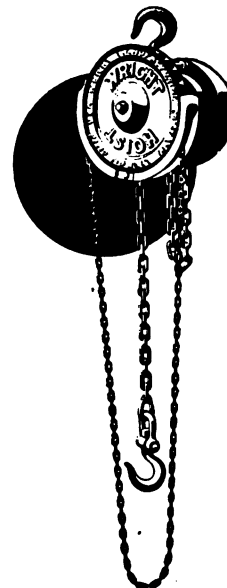
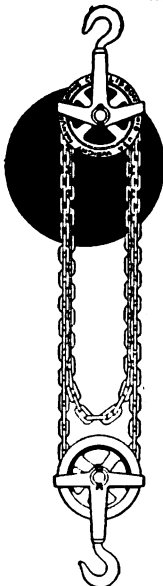
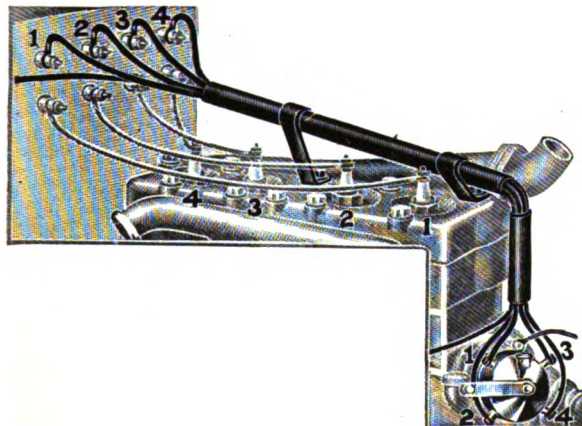
Manufactured by F. P. Lyons, Inc., main office and works, Manchester, N. H. Description and prices on trailers and equipment will be furnished on request.

The Midway Overhead Wiring Assembly for Ford cars is especially designed to keep the ignition wires, as they should be, high, dry and protected. The overhead system keeps them out of the oil and dirt and prevents ignition troubles. It consists of five or six heavily insulated copper wires with soldered terminals, enclosed in impregnated fiber tubing supported by two brackets. Only the best of workmanship and material enter into the construction.

The use of chain hoists in automobile repair shops or garages is of course a necessity, but the proper selection of a hoist as to type involves an understanding of principles that are frequently overlooked. In addition to price, two other factors must be duly considered when a new hoist is to be installed. And these are speed, or the number of feet of hand chain that must

with the one-ton high-speed hoist a pull of 80 pounds only must be exerted as against a pull of 218 pounds with the differential block; and with the two-ton high-speed hoist a pull of 120 pounds is exerted as against 306 pounds with the pulley block.

Thus it is evident the problem reduces to one of labor versus price. From two to three times as much effort must be exerted to lift a load with the differential pulley block as with the high-speed hoist. Even in those cases where very light loads



The wires will outlast several ordinary assemblies, each wire can be renewed, and the tubing and brackets will outwear the car.

The overhead system can be put on in 15 minutes by the use of a wrench and pliers, following the instructions sent with each set.

The five-wire assembly is sent unless otherwise specified.

Manufactured by the Midway Mechanical Co., St. Paul, Minn. Prices: Complete assembly, \$2.50 each; packed 10 in a carton, weight nine pounds. Wires for renewals, \$1.25 per set; packed 50 sets in a carton.

The Wright High-Speed Hoist is designed for progressive garages and repair shops that are ever on the alert for improved tools and methods.

be overhauled to raise the load a given distance—and force, or the pull in pounds required on the hand chain to raise the weight.

As ordinarily made, the number of feet of hand chain that must be overhauled to lift a given load is about the same with both hoists. And, as the differential pulley block is the cheaper hoist, it evidently is to the question of force, or the effort exerted on the hand chain, which must establish the superiority of high-speed hoists.

What are the facts? With a 1/2-ton high-speed hoist a pull of 80 pounds only must be exerted as against a pull of 120 pounds with the differential pulley block;

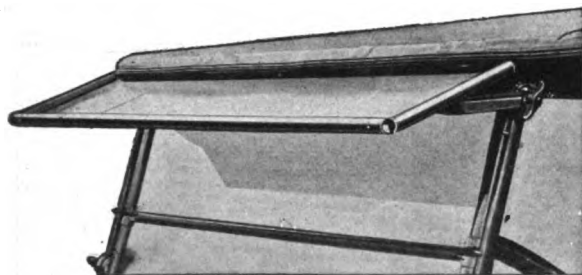
only are lifted and when the hoist is used but occasionally, the saving in man power is sufficient to warrant the use of the high-speed hoist over the cheaper differential pulley block.

In practically all cases, and especially in automobile repair shops, the High-Speed hoist is by far the cheapest to use on account of the fact that it prevents the necessary waste of human effort, the most expensive of any kind of power.

Manufactured by Wright Manufacturing Co., Lisbon, O.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**The Keller All-Metal Windshield Protector** is stated to overcome danger of accidents from lack of vision through windshields caused by sleet, rain, mist, snow



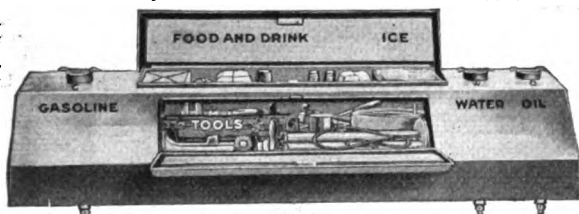
and strong lights. It is adjustable in length to fit any car, also up and down; simple in construction and can be installed by anyone. If will not rattle, is made of sheet metal, galvanized and enamelled in black; it will not rust and will last the life of any car.

It will be noticed from the cut that the lower edge of the Keller Protector is formed into a water conductor, running the water off to either side, which is essential for a practical protector.

It is made in three styles of brackets and, when ordering, the style should be specified, as follows: Open; closed car, including Ford, and Ford open car. The weight is three pounds.

Manufactured by the J. H. Auto Co., Frankfort, Ind. List price, \$6.50 complete.

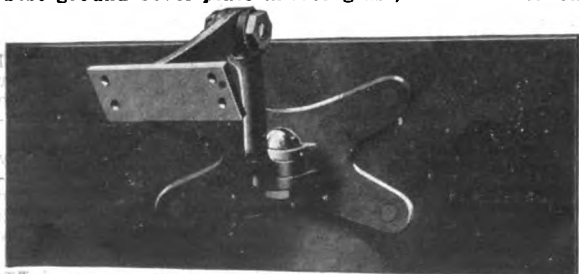
**The Pandolfo Combination Compartment Tank** enables the motorist to carry emergency supplies of gasoline, oil and water, and thus gives the car a greatly enlarged touring radius, less dependent on garages and gasoline stations. It provides that extra supply of gasoline so often badly needed at the end of an otherwise "perfect day." The gasoline supply, as well as the water and oil, are drawn off through convenient key-lock faucets.



There is also included in this outfit space for a considerable quantity of provisions and also for the necessary ice. A compact, handy compartment is also provided that allows carrying of all the tools necessary for the longest trips. They are in the proper place to be quickly reached without disturbing other occupants of the car. Both the food and tool lockers are secured by Corbin locks.

Manufactured by the Pandolfo Manufacturing Co., St. Cloud, Minn. List price, \$50.

**The W. & K. Interior Drive Rear View Mirror** is claimed to be a real adjustable mirror which can instantly be moved to and held at any angle. It is made for open or closed cars, and gives a good view of the road behind. It is made of the best ground bevel plate mirror glass, and

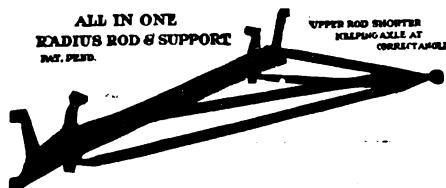


is mounted in a metal frame with a solid back. It is stated that it will not blister and is protected from moisture. The brackets are firmly fastened to the metal back, not to the edge of the glass.

The W. & K. Rear View Mirrors are also made in Model A for open cars equipped with adjustable brackets that clamp to the windshield frame; Model B for closed or any cars on which the upper half of the windshield tips out and Model C equipped with an extension bracket to be used when a lower range of vision is wanted. This is the model shown in the cut. All brackets are interchangeable.

Manufactured by the W. & K. Mirror Co., Indianapolis, Ind. Retail price, \$2.50. A satisfactory discount is offered to large and small dealers.

**The All-In-One Radius Rod and Support** fits all models of Fords, both passenger cars and trucks, and is claimed to absolutely prevent danger of accident through breakage, and to work with equal satisfaction on all models. It holds the car in the road, prevents the axle from buckling in making short, quick turns, and ob-



viates excessive wear on the front bearings and bushings. It is stated to insure against radius rod trouble for the life of the car, gives certain protection against accident and makes the car easier to steer. The upper rods are made slightly

shorter, giving the axle the correct tilt and keeping it permanently in that position. It makes the car easy to drive in the deepest sand or mud.

The All-In-One is made from four pieces of Bessemer steel tubing, welded into one solid piece, the ball being forged out of the tubing, making an absolutely rigid one-piece support for the front axle. It requires no extra bolts or clamps to rattle and work loose.

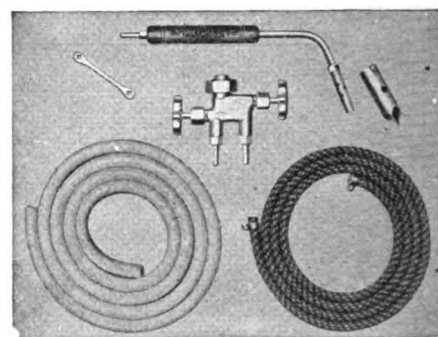
Manufactured by the Tungsten Manufacturing Co., Marshalltown, Ia.

**The Washburn Soldering, Brazing, Lead Burning and Welding Outfit, No. 1045-A**, is an equipment designed for the exclusive use of automobile, radiator, storage battery, electrical, bicycle and motorcycle repair shops, plumbers, tool makers, etc., for soldering, brazing, light aluminum welding, lead burning, heating tools for hardening, straightening and expanding, loosening tight fits and any job requiring heat up to 5300 degrees Fahrenheit.

The torch operates on Prest-O-Lite gas and compressed air and burns 15 parts of air to one of gas. Tank attachment or mixing valve is easily adapted to A, B or E size Prest-O-Lite tank. Air derived from any air line furnishing 20 pounds pressure or over. Small air tank with foot pump can be used. Needle point flame instantly adjustable through a range of 4000 degrees without changing tip. The most economical, efficient and time saving torch on the market doing the same class of work.

This Washburn Outfit, No. 1045-A, consists of one Wash-

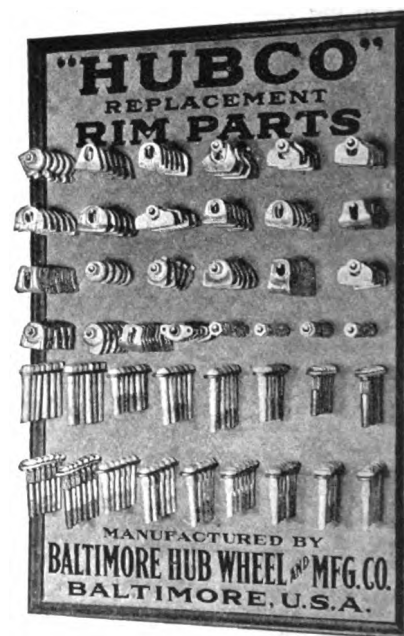
burn torch, one mixing valve (tank attachment), one soldering iron attachment, two six-foot hose lengths hose connections and one Prest-O-Lite tank key.



A big feature of this outfit is the soldering copper, which can be slipped over the shell protecting the torch tip, enabling a change to be made from a torch to a soldering iron in less than a minute.

Manufactured by the Washburn Burner Corporation, Kokomo, Ind. List price, complete, \$19.50; extra burner shells, 75 cents; extra burner tips, 25 cents. Detailed selling proposition furnished jobbers and garage men on request.

**Hubco Replacement Rim Parts** are made of properly annealed malleable iron and are of the proper size and dimension. They are designed to eliminate all annoying squeaks, to be unaffected by weather conditions, to be in proportion and suited to the pocket book of the average motorist. When it is stated that the Hubco rim parts are properly annealed it is meant that they are not so hard as to wear away the rims, which are also annealed. A rim



is much more expensive to replace than the various clamps and it is better that the latter should wear rather than the former.

Hubco replacement rim parts are galvanized with a heavy double coating that will never rust, and are sold and handled in such a way that makes it almost impossible to get the wrong equipment. Jobbers and dealers handle the Hubco line in connection with the manufacturer's specification sheets, which show what cars use the different stock numbers.

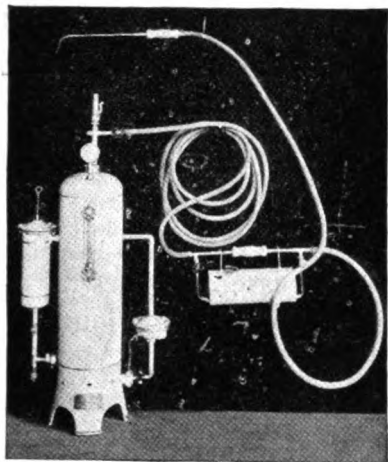
Manufactured by the Baltimore Hub-Wheel & Manufacturing Co., Baltimore, Md. Prices supplied on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



**The Eureka Automatic Steam Generator No. A-1 E**, equipped as a parts cleaner, grease eradicator and paint remover, is recommended for small public garages, cleaning establishments or private owners. It will clean eight to 10 cars a day when used as a grease eradicator and parts cleaner and two to five a day as a paint remover, the capacity consists of a generator or boiler equipped with automatic fuel and water control, an atomizer and solution tank, together with the necessary hose connections, filler plugs, valves, atomizing jet and tube.

The generator is of the flash or quick steaming type, fitted to burn artificial or natural gas or gasoline, and will build up working pressure in a short time; it is of sufficient capacity to maintain a working pressure of 50 to 60 points at the nozzle for constant service. The heating surface consists of a copper coil, spiral in form and continuous, assembled so as to admit



of a very rapid internal water circulation and gas travel. The automatic fuel and water control eliminates the necessity of attention on the part of the operator.

The solution tank is so arranged that it may be carried in the hand or placed on the floor, bench or any convenient place as desired by the operator. The tank is furnished in two sizes, one and three-gallon capacity.

Following are the specifications of the No. A-1 E outfit: Maximum capacity, gas burner, 50 to 60 feet an hour; diameter of shell or casing generator, nine inches; diameter of base, 12 inches; height of apparatus over all, 48 inches; weight of generator, 100 pounds; weight of complete apparatus, 125 pounds.

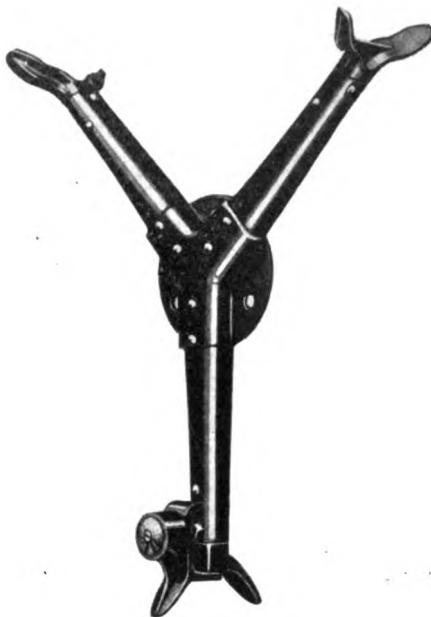
Manufactured by P. M. Lattner Manufacturing Co., Cedar Rapids, Ia. Prices on application.

**The Oakes Tire Carrier** embodies all the advantages of older types with additional improvements that are claimed to give it greater accessibility, strength, beauty and more distinctive appearance, marking a notable advancement in equipment for holding spare tires. Aside from its simple and striking design, an important feature is that it enables the car builder to effect a real economy in production, because it is interchangeable with the dummy hubs used to carry spare wire or disc wheels. This advantage permits the car manufacturer to mount a standard carrier support bracket on each car as it moves forward in production. Then if the car uses wood wheels as regular equipment the Oakes carrier is bolted to the face of the bracket. If disc or wire wheels are to be used the car maker simply bolts an ordinary dummy hub to the bracket.

For instance, where the manufacturer of a car, equipped with wood wheels and the Oakes Tire Carrier, receives an order for a special job with steel disc wheels, it is an easy matter to take out the three bolts from the carrier, remove it from the

bracket and bolt a dummy hub in its place.

The new carrier is constructed of high-grade pressed steel parts securely rivetted



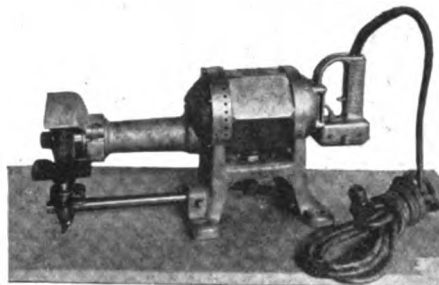
together, and exacting tests prove it to be exceptionally strong, safe and rigid. It requires no unsightly straps or fittings to hold the tire rim firmly in position, as a simple rim clamp of conventional type is used on the lower arm of the carrier, and the tire is readily mounted or demounted by unscrewing or tightening one nut.

The Oakes carrier is made in a wide variety of wheel sizes to fit all demountable rims and in single and double carrier styles.

In order to give the car owner adequate protection against the theft of spare tires from the rear carrier, the Oakes company offers, as optional equipment, an effective locking device, which is shown in the illustration installed on the lower arm of the carrier. It comprises a rim wedge clamp integral with a barrel-shaped casting which has a circular lock flush with the outer face. This device prevents anyone from unscrewing the nut and demounting the tires. The lock is firmly held in the housing by its two lugs, which expand behind a circular flange, after which a socket wrench is used on the clamp nut which holds the tire.

Manufactured by the Oakes Co., Indianapolis, Ind. Prices on application.

**The Pistol Grip and Trigger Switch** has been perfected and is now offered to the trade by the Black & Decker Manufacturing Co as an attachment to its portable electric grinder, which embodies all the well known features of Black & Decker construction. This Pistol Grip and Trigger Switch Control attachment gives the operator entire control over the



tool at all times, making it unnecessary to shift either hand to start or stop it.

While this product is essentially a portable electric grinder, it is supplied com-

plete with quick detachable base and adjustable tool rest so it can be used with equal facility as a bench grinder. Besides the base the equipment also includes two five inch by one inch grinding wheels, one fine and one coarse, a wire brush wheel and a rag buffing wheel. With this complete outfit it is not necessary to buy any extras to take care of any grinding, cleaning, buffing or polishing jobs around garage, service station, vulcanizing shop, machine shop or foundry.

There are literally scores of jobs that can be done with this grinding machine, such as sharpening tools, smoothing castings, etc., smoothing welds, grinding off rivet heads, cutting tubing, notching raw stock, brushing and buffing, removing rust, paint, road tar, etc., cleaning metal parts, smoothing automobile bodies, polishing metal fixtures and roughing tires, and it can be used as a power unit for testing generators, magnetos, distributors, etc., by mounting a pulley on grinding shaft.

Mechanically this grinder has several new and distinctive features, but follows, for the most part, the most approved grinder practise. It has grease lubrication throughout, forced air cooling, chrome nickel steel gears and shafts and aluminum alloy housing. The entire mechanism is protected from dust and other foreign matter.

Owing to its design and the use of the finest materials only this grinder is exceptionally light.

A particularly desirable feature is the fact that these grinders can be operated on either direct or alternating current at will.

The specifications are as follows: One-half horsepower; speed with no load, 3200 revolutions a minute; wheel size, five inches by one inch; diameter of wheel arbor, three-fourths of an inch; net weight, without base, 21 pounds.

Manufactured by the Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md. Prices and literature on application.

**The Victor No. 60 Spot Lamp** is a favorite member of this well known line, and one of its features is its dash control. An independent switch on the dash enables the driver to operate the light with ease when the side curtains are up for stormy or rainy weather. The reflector is a true parabola, silver plated on brass. The lens



is convex and a special focussing device, controlled by a single screw, enables the driver to readjust the focus when necessary.

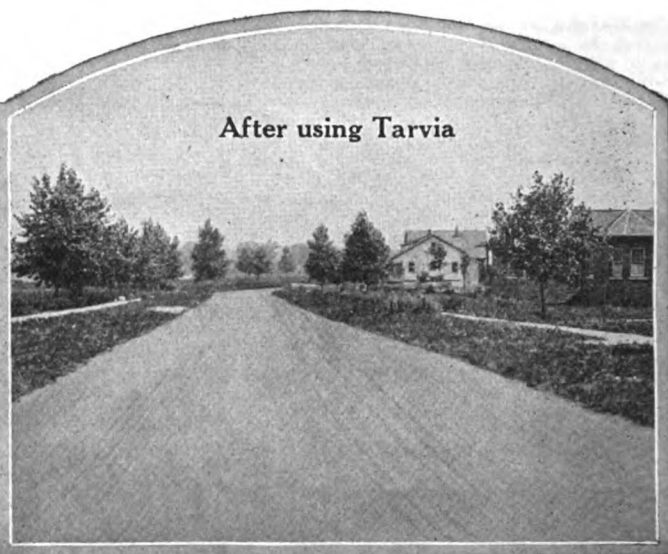
From the standpoint of appearance the Victor No. 60 Spot Lamp will appeal to the motorist as a desirable accessory. It is handsome in its dignified coat of black and enamel and although built on a light aluminum base, it gives an impression of massiveness in keeping with modern car design.

Manufactured by the Corcoran-Victor Co., Cincinnati, O. Prices and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



*Wretched condition of Kenilworth Avenue, Villa Park, Ill., before the use of Tarvia*



*Picture of same section after being constructed with "Tarvia-X." Note excellent condition of road today*

## Good Roads Boost Property Values—

**Y**OU can easily see how Tarvia has improved property values along Kenilworth Avenue, Villa Park, a pretty suburb of Chicago, Ill.

Here was a stretch of road that was bumpy and "hard going" on even the best of days, while during the Spring thaw and after a heavy rain, it was practically impossible to navigate.

That was its condition before the road authorities of Villa Park turned to Tarvia. Tarvia will make this road last for years. With but occasional inexpensive treatments with "Tarvia B" as the traffic demands it, it will always be free from mud and dust, waterproof, frost-proof and

traffic-proof. It has increased the desirability of the abutting property many hundred per cent.

For these reasons Tarvia streets have the hearty approval of taxpayers everywhere. The story of Kenilworth Avenue is being repeated in many cities and towns all over the country.

Tarvia is a coal-tar preparation for use in constructing new macadam roads or repairing old ones. One tarvia road in your community will prove to you and your townspeople how Tarvia roads increase property values and decrease taxes.

*Illustrated booklet telling about the various Tarvia treatments free on request.*

# Tarvia

*For Road Construction  
Repair and Maintenance*

### Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will be given prompt attention.

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## Hints to Motorists in Care and Operation of Car

### COMMON LUBRICATION FALLACIES.

There are four very common lubrication fallacies that are claimed to be responsible for a great many operating troubles. Some autoists seem to think that oil is a good thing, and that you cannot have too much of it. They believe that if the oil reservoir is filled above the indicated height level better lubrication will be provided. This is a mistake. For ordinary running oil should be kept at the proper level—no higher. Overfilling causes excessive carbon, gummed valve stems and sooty spark plugs. The only time a high oil level is required is just after the crankshaft bearings have been tightened, when there is a possibility of one of the bearings freezing or becoming too tight to turn. A surplus of oil at this time will assure the bearings fitting the crank pins accurately and prevent them from scoring or sticking.

Owners of cars with badly worn engines have found from experience that a heavier oil than what they have been accustomed to use will give better results, as the heavier oil causes a film between the bearings and the bearing surfaces of the crankshaft, which stops excessive noise and makes a smoother operating engine. Pistons and rings of badly worn engines develop more power with heavier oil, as the piston clearance between the walls of the cylinders and the piston is sealed with the film provided by the heavier oil.

One fact that must be considered, however, is that pressure oiling systems cannot handle heavier oil as satisfactorily as the lighter grades, as the lubricant has to be forced through tubes and openings into the bearings and parts of the engine.

Many motorists have the impression that the crankcase should be rinsed out with kerosene after the oil has been withdrawn. A better way to accomplish this, and one that does not leave a kerosene residue in the oil troughs, under the connecting rods or in the engine oil reservoir, is to drain out the oil after the car has been given a long run, which warms

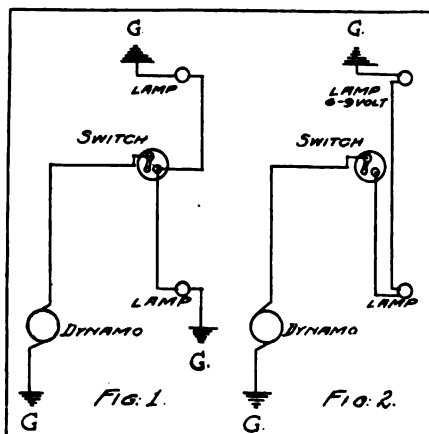
the engine and the oil thoroughly. Draining the oil under these conditions, takes out the sediment easily without the necessity of using gasoline or kerosene. Flush out the base with a quart of fresh oil and refill the reservoir.

Lastly, is the common assumption that any oil used is all right. This, perhaps, is the greatest error that a motorist can make, as it sends more cars to the repair shop than all other causes combined. The motorist cannot watch from day to day the inside of his engine; hence, he is in no position to know accurately the effects of different oils. While many oils may seem to work all right only one may be giving him scientific lubrication, and only that one grade can give him the lowest fuel bills, the lowest oil bills and the lowest repair bills.

The avoidance of these common mistakes and the use of oil which is scientifically correct for the car will show results both in economy and engine power.

### ELECTRIC DASH AND TAIL LIGHTS FROM FORD MAGNETO.

An ingenious arrangement for electric dash and tail lights operated from the Ford magneto is shown. The dash and



Methods of Connecting Dash and Tail Lamps on Fords.

tail lights are connected in series, and each bulb should be six-volt, two-candle power—this point is very important. The reason they do not burn out is that the sum of their resistance is greater than that of the regular Ford headlight bulbs; therefore, the excess current shunts through the headlights as only a small part of it can pass through the smaller bulbs, under normal use not sufficient to burn them out.

The arrangement shown in Fig. 2 was used on a 1917 Ford for six months without renewing any of the lamp globes.

In Fig. 1 is seen another method of connecting the lights for dash and tail lamps. In this case it will be necessary to use two 18-volt, two-candlepower lamps, as they are wired in multiple instead of in series and the voltage of each much equal the voltage given by the Ford magneto; otherwise, the lamps will quickly burn out. Better results will, however, be had with the six-volt, two-candle power lamps first mentioned, which may be purchased at almost any service station at a nominal sum.

### SOME PERTINENT "DON'T'S."

Do not run the car any distance on a deflated tire. At the first warning stop and make the change. Nothing will break down the tire walls more quickly.

Do not try to make every hill in high speed. Nothing is to be gained by so doing. Your gearset is designed to meet such requirements. If you persist in this practise you will soon find it necessary to refit the engine bearings and, furthermore, you will greatly reduce the tire mileage of the driving wheels.

Do not approach a down grade at speed and then apply the brakes suddenly to bring the car under control. Many accidents occur from this cause, especially on wet roads. Aside from this the tires suffer and the brakes wear out quickly.

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We Are Experts in  
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303 Knoxville Avenue,  
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Motors, \$20.00 up	E. Presto Tanks, \$4.00
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Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,  
Write Us—We Have It.

**Conn. Auto Parts Co., Inc.**

18-20 Morgan St., Hartford, Conn.

### AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,  
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LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 3.00 up
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Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

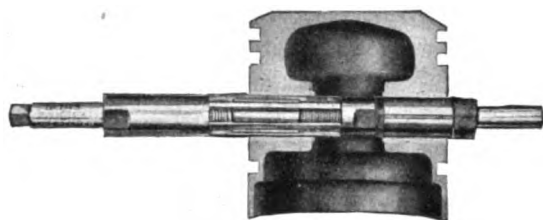
\$12 Diamond Bumpers.....\$5.50  
Jobbers in Bankrupt Auto Supplies.

**BRIGHTMAN AUTO EXCHANGE**

321 Windsor Ave., Hartford, Conn.

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# Save Time, Worry and Work in Reaming Wrist Pin Bushings



Don't sweat and fuss trying to ream motor wrist pin bushings in accurate alignment without proper tools. What you need is the

## SUPER-SIX LINE REAMER

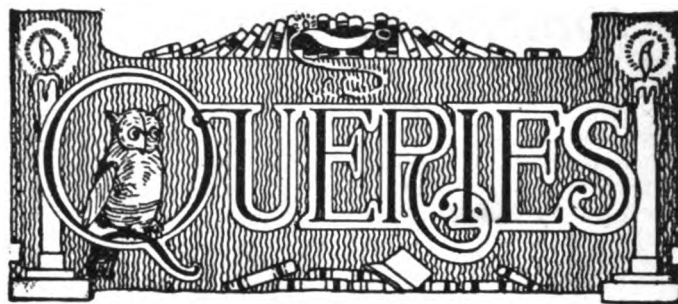
the tool that makes the job easy. With Super-Six Line Reamers you can do the work of several sizes of solid reamers, which, collectively, would cost you several times as much to buy and are comparatively short-lived.

Super-Six Line Reamers are made in two sizes at present; No. 745, which is adapted to use on Fords and nearly 40 other makes of cars and motors, and No. 875, which can be used on nearly 80 leading makes and models of automobile motors. Write for literature and lists of wrist pin bushings these reamers fit.

**Cutter & Wood Supply Co.**  
274 Friend St.,  
Boston, 9 Mass.



115-37



### NO. 2 CYLINDER LACKS COMPRESSION.

(C. N. B., Jonesville, S. C.)

On my car the No. 2 cylinder has no compression or power. I find out that the exhaust valve does not seat. In other words, when it is forced up by the tappet it will not come back into the seat. Do you suppose that the spring has lost its tension or that the valve is worn out?

The valve stem is probably bent and should be removed and straightened. If bent or worn badly it would be best to replace with a new valve, taking care to grind it in properly so that it will seat. If all of the valves are not properly seated the engine will lose compression and power.

### CRANK CASE COMPRESSION.

(J. C. B., Lowell, Mass.)

I have noticed in my engine that there is air pressure coming from the vent pipe when the engine is running. My friends tell me that this indicates a scored cylinder. The engine seems to run perfectly.

Vent pipes or breather tubes are installed on the engine to relieve crank case pressure. As the pistons travel up and down in the cylinders there is more or less pressure created in the crank case. In a new engine this is hardly noticeable.

Loss of compression indicates a scored cylinder, and the result is that the gas mixture in the combustion chamber is leaking by the piston in the score, weakening the compression and consequently the power of the engine. Defective rings or leaking valves also cause weak compression and at the first indication of this trouble should be searched for and remedied. A scored cylinder or trouble with the rings means that the engine should be disassembled and the parts either replaced or repaired. Leaking valves are best restored to their former usefulness by grinding which will reseal them, making them gas-tight. Remedying the trouble restores the power of the engine.

### STARTER TURNS OVER SLOWLY.

(R. R., Hawthorne, N. J.)

I lost my main gasoline tank cover recently and would like to know where to replace it with a combination cap and gauge. Please tell me where I can purchase such an article. I am also having trouble with my starter, when the engine is cold it turns over very slowly or not at all. The battery is fully charged and the brushes seem to be in good condition. What is the trouble?

You can obtain the filler cap and gauge from either Standex, Inc., 341-49 East Ohio street, Chicago, Ill., or the Apco Manufacturing Co., Inc., 702 Eddy street, Providence, R. I.

As you do not mention the make of your car it is rather difficult to tell the trouble without seeing it, but from your meager description we should say that if the car is a Ford or a new car of some other make, the trouble is probably that the engine is stiff either in the bearings or, in the case of a Ford, that the oil has congealed over night, causing the engine to be stiff in the morning. This is a common occurrence with Fords, especially when new. Turn the engine with the hand crank for a few minutes to loosen the oil and trying the starter will then usually start the engine. If the engine bearings and parts are new and stiff the battery will show this fault till the bearings have worn in, when the bat-

(When Writing to Advertisers, Please Mention the Automobile Journal.)

tery and motor will be found to start the engine easily.

On the other hand, if the engine is limbered up, it is possible that the battery connections are loose and tightening them will remedy the trouble; or the battery terminals may be covered with corrosion from the battery, offering high resistance to the flow of current. Removing the connections and sandpapering, afterwards covering them with vaseline, setting them up tight in the clamps should remedy the trouble.

#### REASON FOR CHANGE OF POLARITY.

(A. B., Alton, Ill.)

A Hupmobile Model 37 was brought to our shop because it was without power or pep, but the engine would run. The battery had been recharged a few days before.

When the battery was examined it was found to be connected with the negative terminal grounded to the car frame. Turning the battery and grounding the positive side and changing the ammeter wires, as they had previously been changed to read correctly with the negative connection, it was found that the engine would run correctly, but it will not run with the negative grounded.

Whoever connected the battery in this Model 37 Hupmobile certainly was wrong when he grounded the negative terminal of the battery to the car frame and changed the ammeter to read discharge when the engine is running. The positive terminal of the battery should be connected to the ground, allowing the generator to recharge the battery correctly and according to the windings of the machine.

With the negative side of battery grounded you had what is termed a "bucking current." That is, the generator is trying to complete a circuit through to battery and is being met by the battery current flowing in a reverse order, with the result that the battery is soon exhausted and the generator has not the chance to keep it recharged.

Grounding the positive side of battery corrects this trouble and allows the generator to recharge the battery. The ammeter should read to correspond with this battery connection and should show "discharge" when the engine or lights are being used and "charge" when the engine speed is above 15 miles an hour on the road.

#### CYLINDERS QUICKLY CARBONIZE.

(F. L. W., Charleston, S. C.)

I am experiencing much trouble with a light delivery wagon in which the motor quickly carbonizes. I have used several kinds of oil and reduced the feed as low as possible, yet when I have run the machine for three or four days there are considerable deposits of carbon in the cylinders, which greatly reduces the power, as well as causing a very loud knock. The carburetor has been adjusted very closely, but without improvement. Can you suggest what may cause this condition?

Overheating may be the result of many conditions, such as impeded water circulation, retarded spark, loose fan belt, sticking valve, rich or lean mixture, weak magnets on the magneto, insufficient oil supply, grounded wires, tight bearings, etc. Your car has been in continuous service and overheating has recently developed. As you state that the carbon has been removed and the car was operated over all kinds of roads and no doubt in all kinds of weather, you may be experiencing a trouble not infrequently met with. Usually the radiator is covered on both sides with a net work, which is commonly termed honeycomb. During rainy weather, when the road surfaces are soft, mud will splash and be deposited in this net work. In time these accumulations will greatly lessen the effective cooling area of the radiator by obstructing the circulation of air. This will prevent the radiation of the heat in the water and consequently overheating must result. The remedy is to remove this dried accumulation with a piece of wire, and when this is done and the cooling system is again normal the engine ought to have its former efficiency.

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## WEATHER

THE knowledge that the Zenith Carburetor automatically adjusts itself to any change in weather, temperature or altitude has always been a source of satisfaction to us.

It pleases us to realize not only that Zenith users are free from the petty annoyance of constant carburetor adjustment, but also that the uninterrupted service which Zenith gives them is steadily increasing the public good will toward our product.

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—and now  
a bearing  
fitting compound

## THE O-U-E-Z 100% Bearing Fitting Compound

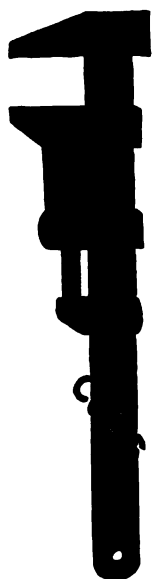
At last! A compound for fitting bearings—a long felt need. The O-U-E-Z (it's so easy to use) is the only known compound of its kind on the market. With it you can fit bearings in 30 minutes to an hour instead of the usual 60 to 70 hours. Besides grinding bearings it polishes the shafts; aligns bearings and valve seats; helps to lap pistons and rings and gives a high polish to all kinds of brass work, valves, valve seats, etc. **WILL NOT SCRATCH.**

O-U-E-Z is sold in 14-ounce cans, enough to align 15 motors. Price \$5.00, postage paid. Satisfaction guaranteed. Order a supply now.

*Dealers and State Distributors Wanted  
Write for Proposition.*

**Southern Bearing Compound Co.**  
Little Rock, Ark.

## COES *The Standard* WRENCH



**WRENCHES** that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

***The Best Wrench  
The Cheapest***

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

**COES WRENCH COMPANY**  
WORCESTER, MASS.

### FRONT WHEELS WABBLE.

(R. C. P., Boston, Mass.)

When driving my car about 15 miles an hour a considerable "wabbling" movement occurs in the front wheels. I do not notice this at other speeds. How can I remedy this?

This would indicate a great amount of lost motion in the steering knuckles and steering drag links. A little wear at each place will total a considerable amount. You should go over each connection carefully, replacing those parts that cannot be tightened; otherwise it will be impossible to prevent the wheels from wobbling. When travelling at a higher speed the tendency is for the wheels to run true of their own accord.

### USING REVERSE AS BRAKE.

(H. F. S., Lafayette, Ind.)

I am told that with the Ford type planetary transmission the reverse may be used as a brake, while with the selective type, as used on larger cars, this is not possible. Why is this?

In the planetary type transmission used in the Ford car, all gears are in mesh and the reverse is operated by a contracting band, as is also the first speed and the service brake. If the service and emergency brakes are out of order or worn excessively, and it becomes necessary to have a brake, the reverse may be used to slow down and stop the car. Its use for an extended period is not advisable as the constant wear of the lining soon makes the reverse inoperative for reverse service. Taking up the bands will restore them to use, until the lining is worn down too thin, when it becomes necessary to have them relined again.

In operating a selective type transmission it is necessary to mesh the gears as they travel at different speeds. It is at times possible to use them, but usually not in the case you mention. When descending very steep hills the selective type transmission gears may be shifted into lower speeds, and the descent made with greater safety and less wear on the brake linings.

### USING WATER TO REMOVE CARBON.

(D. S. F., Providence, R. I.)

Will water put in the air intake of the carburetor while the engine is running help to stop carbon collecting in the combustion chambers and on top of pistons?

Unquestionably water run through the engine in the manner mentioned washes away some of the carbon. It also has a tendency to soften the carbon deposits so that they burn away more rapidly. Some of it collects in the carbon and turns to steam, blowing the carbon loose, and it is carried out by the exhaust. If you have a muffler cut-out it should be held open during the process. Put a piece of newspaper under it and you will be surprised at the amount of carbon removed. Alcohol or peroxide of hydrogen may be used in the same manner. Kerosene is often used for this purpose by repairers, and is considered a quick method of removal; however, the dense smoke which it creates is disagreeable and often as much carbon is left in the cylinders as is removed by the kerosene.

Perhaps the best method of all is that of burning out the carbon with a oxy-acetylene flame. This method consumes the carbon and does not hurt the metal of the cylinders or pistons. Only a few minutes time is required and almost every repair shop and service station is prepared to do this work. The charge is nominal and repairers are well experienced in the work.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



# GREYHOUND TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.  
GENERAL OFFICES & FACTORY  
CLEVELAND

*On the trail of a Good Tire*



# THE SUCCESS of the DEALER

Without the successful dealer no factory organization can be a success. So, with the Huffman organization "Factory Co-operation" is more than a mere phrase—it is a vital living force which has enabled us to secure many desirable dealers whose success is indissolubly linked with ours. We want more of the right kind of dealers—are you one?



The specifications and illustration prove that the Huffman Six is the much sought after type of "family car." Where can you buy a car of the Huffman class at anywhere near the Huffman price—a car with a Continental Motor—a Borg & Beck clutch—Covert transmission—Hardy flexible disc universals and other high grade standardized parts, together with the complete equipment and refinements found only on the higher price cars?

Write or wire today for dealer proposition.

## SPECIFICATIONS

Motor—Continental 6-cylinder,  $3\frac{1}{4} \times 4\frac{1}{2}$ .  
Transmission—Covert—three speed selective type integral with motor.  
Clutch—Borg & Beck 10 inch, 10 spline.  
Lubrication—Combined force feed and splash.  
Cooling—Centrifugal pump.  
Springs—Front, 37", semi-elliptic Clemens. steel bushings fitted with oil cups and

wicks; Rear, 56", bottom leaf special alloy steel.  
Axles—Front I-beam; rear full floating and spiral gear driven.  
Tires—32"x4" straight side, non-skid on rear.  
Wheelbase—120 inches.  
Carburetor—Stromberg.

Dyneto—2-unit, 6-volt, starting and lighting system. Willard battery. Connecticut ignition.  
Propeller Shaft Universals—Hardy flexible discs eliminate universal joint trouble and require no lubrication.  
Weight—2,680 pounds.  
Price—\$1995—f. o. b. Elkhart, Indiana.

## ADDITIONAL REFINEMENTS THAT PROVE THE CAR'S COMPLETENESS.

Regular tailor made, actual one-man top.  
Genuine leather straight plaited upholstery.  
Inlaid linoleum covered running boards and floor boards.  
Stewart-Warner speedometer.  
Accurate gasoline gauge on tank.  
12-ft. extension trouble lamp cord from in-

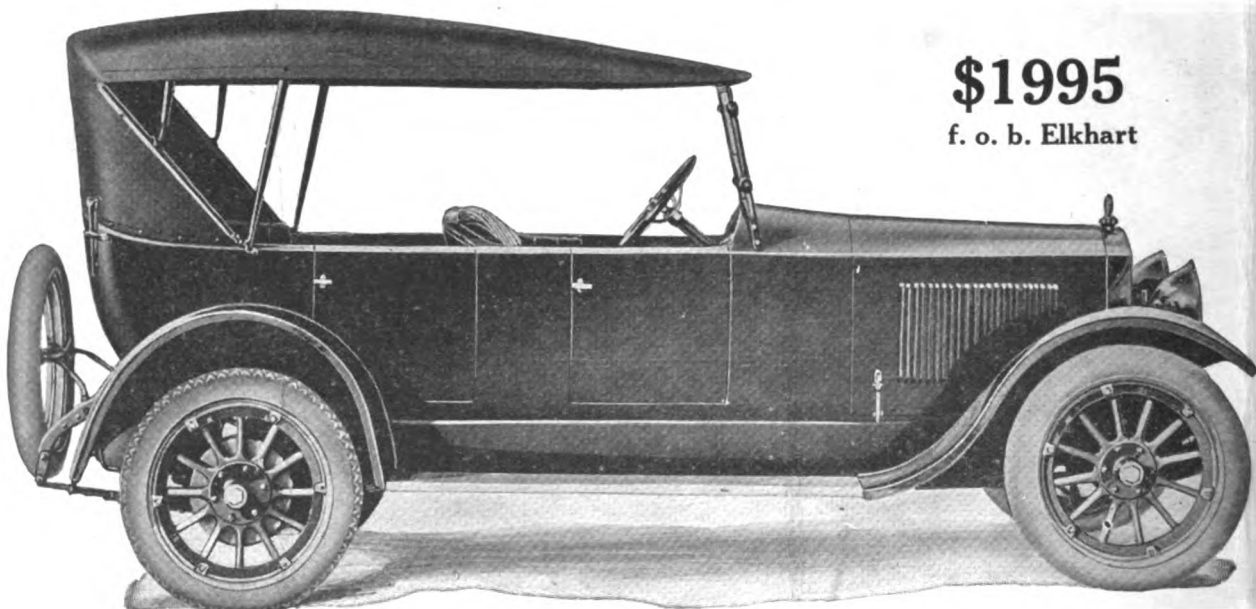
strument board light.  
Three-way tonneau light.  
Rigid tire carrier on rear.  
Automatic shut-off ignition switch.  
Double ventilating windshield.  
Robe rail on back of front seat.  
Large pocket in front doors and rear of

front seat.  
Complete set of good tools, jack and pump.  
Motometer on radiator cap.  
10x24" plate glass rear curtain window.  
Side curtains open with doors.  
Colors—Foch Gray, Victory Blue, Huffman Maroon.

## Huffman Brothers Motor Co.

Factory, Elkhart, Indiana  
Makers of the Huffman Truck

Showroom  
2425 Michigan Ave  
Chicago



**\$1995**

f. o. b. Elkhart



20 Cents the Copy

\$1.50 the Year

# AUTOMOBILE JOURNAL

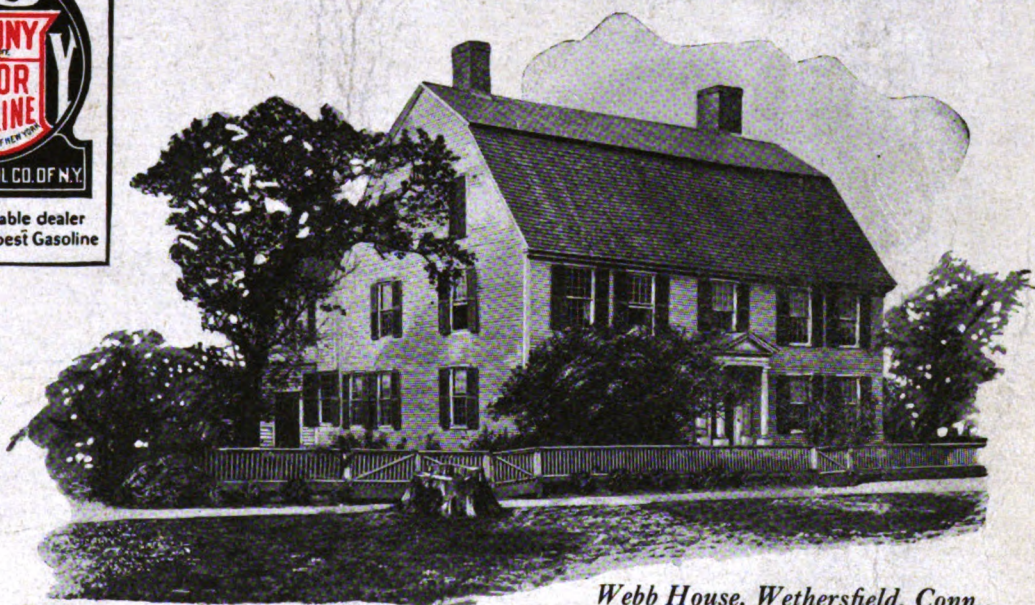
DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXVIII.

PAWTUCKET, R. I., SEPTEMBER, 1920.

NO. 2



*Webb House, Wethersfield, Conn., in which, on May 21, 1781, Washington and Rochambeau planned the siege and capture of Yorktown.*

FROM Wethersfield, Conn., to old Provincetown, down on the Cape, and from there to Niagara Falls—over the city boulevards and all along “the trail”—you can find the familiar Socony sign. It is the symbol of a superior product and supreme service. For permanent motoring satisfaction and economy, fill up regularly at the red, white and blue Socony sign.

*Every motor highway and byway throughout picturesque New England and New York is a part of the long “Socony Trail”.*

STANDARD OIL CO. OF NEW YORK

## SOCONY

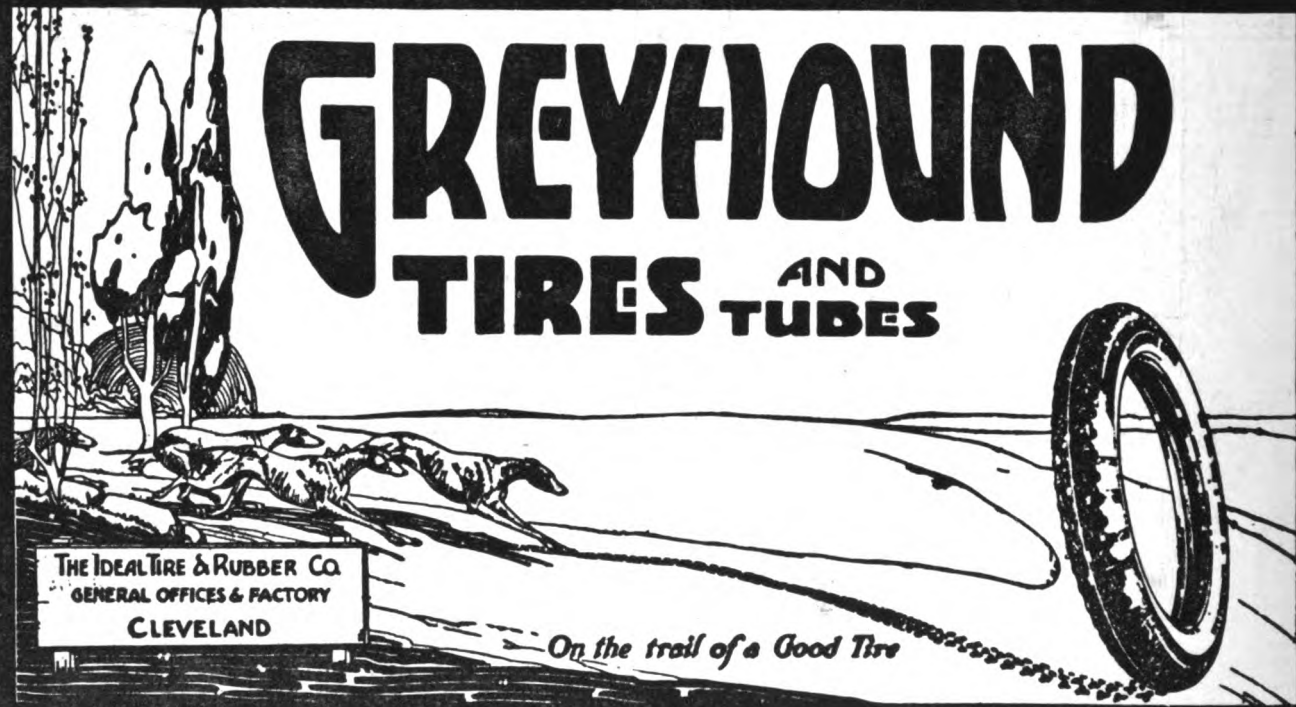
REG. U.S. PAT. OFF.

### MOTOR GASOLINE

*“Every Gallon  
the Same”*



# GREYHOUND TIRES AND TUBES



THE IDEAL TIRE & RUBBER CO.  
GENERAL OFFICES & FACTORY  
CLEVELAND

*On the trail of a Good Tire*



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*DEVOTED TO*

*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., OCTOBER, 1920.

NO. 3.



*Old Orchard Home, Concord, Mass.,  
where Louisa M. Alcott wrote "Little  
Women" in 1867.*



The sign of a reliable dealer  
and the world's best Gasoline

**S**OCONY isn't merely one of many gasolines. It represents fifty years of refining experience, and is made by the most improved methods known to the industry. It is truly the standard of quality gasoline.

STANDARD OIL CO. OF NEW YORK

*Every motor highway and  
byway throughout pic-  
turesque New England  
and New York is a part  
of the long "Socony  
Trail".*

## SOCONY

REG. U.S. PAT. OFF

### MOTOR GASOLINE

*"Every Gallon the Same"*



# GREYHOUND TIRES AND TUBES



THE IDEAL TIRE & RUBBER CO.  
GENERAL OFFICES & FACTORY  
CLEVELAND

*On the trail of a Good Tire*





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*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., NOVEMBER, 1920.

NO. 4.



*Washington's Headquarters, Newburgh, N. Y.  
Here, at the close of the American Revolution,  
Washington issued the proclamation of peace  
and disbanded the old Continental Army.*



The sign of a reliable dealer  
and the world's best Gasoline

*Every motor highway and  
byway throughout pictur-  
esque New England and  
New York is a part of the  
long "Socony Trail".*

**P**RESENT Socony users find it economi-  
cal the year round. They enjoy the full  
benefit of a permanent carburetor adjustment  
because they can fill up with Socony when-  
ever they need it.

For complete motoring satisfaction, fill up  
regularly with Socony gasoline.

Look for the red, white and blue Socony sign.

STANDARD OIL CO. OF NEW YORK

## SOCONY

REG. U.S. PAT. OFF.

### MOTOR GASOLINE

*"Every Gallon the Same"*



# GREYHOUND TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.  
GENERAL OFFICES & FACTORY  
CLEVELAND

*On the trail of a Good Tire*





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*DEVOTED TO*

*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., DECEMBER, 1920.

NO. 5

## The National Auto Shows

Under Auspices of National Automobile Chamber of Commerce, Inc.

**AT NEW YORK —**

Grand Central Palace  
Jan. 8<sup>th</sup> to 15<sup>th</sup>.

**AT CHICAGO —**

Coliseum and Armory  
Jan. 29<sup>th</sup> to Feb. 5<sup>th</sup>

*Bigger and Better Than Ever*

S.A. Miles, Manager.

366 Madison Ave. N.Y.

The Advance New York Show Issue of the

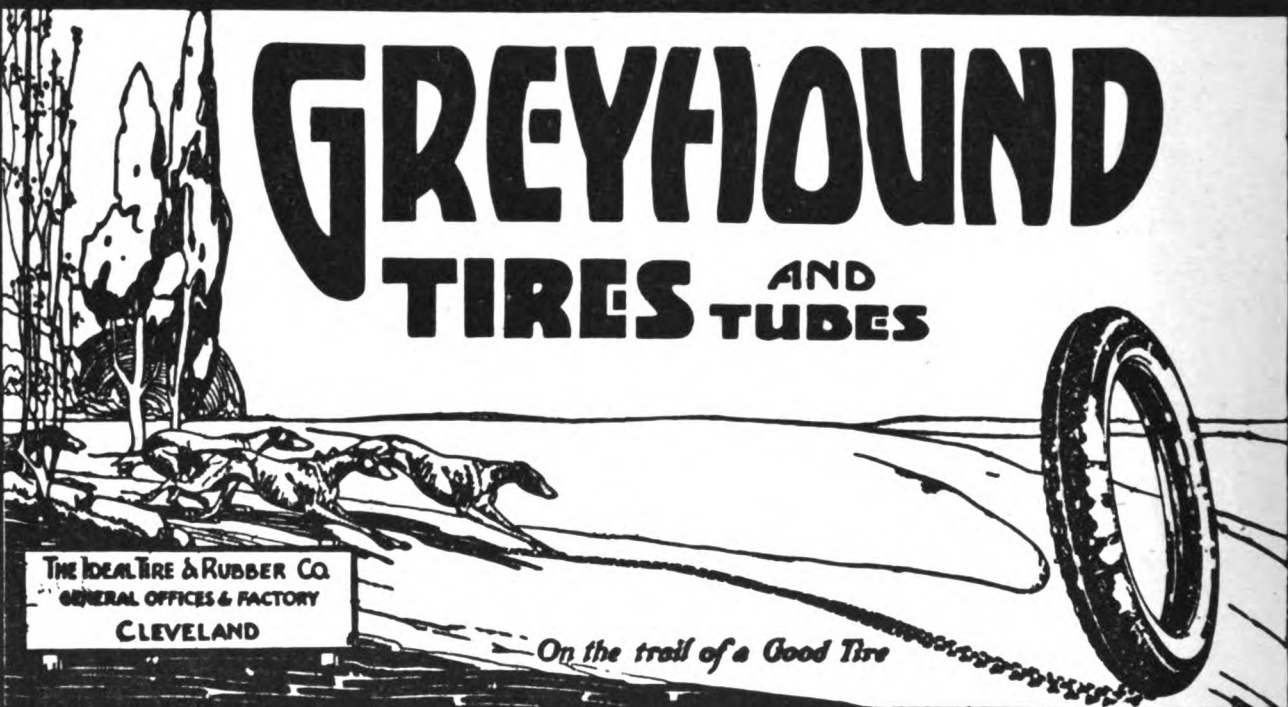
Automobile Journal

Will Be Mailed January 7, 1921

Make Your Reservation for Space at Once



# GREYHOUND TIRES AND TUBES



THE IDEAL TIRE & RUBBER CO.  
GENERAL OFFICES & FACTORY  
CLEVELAND

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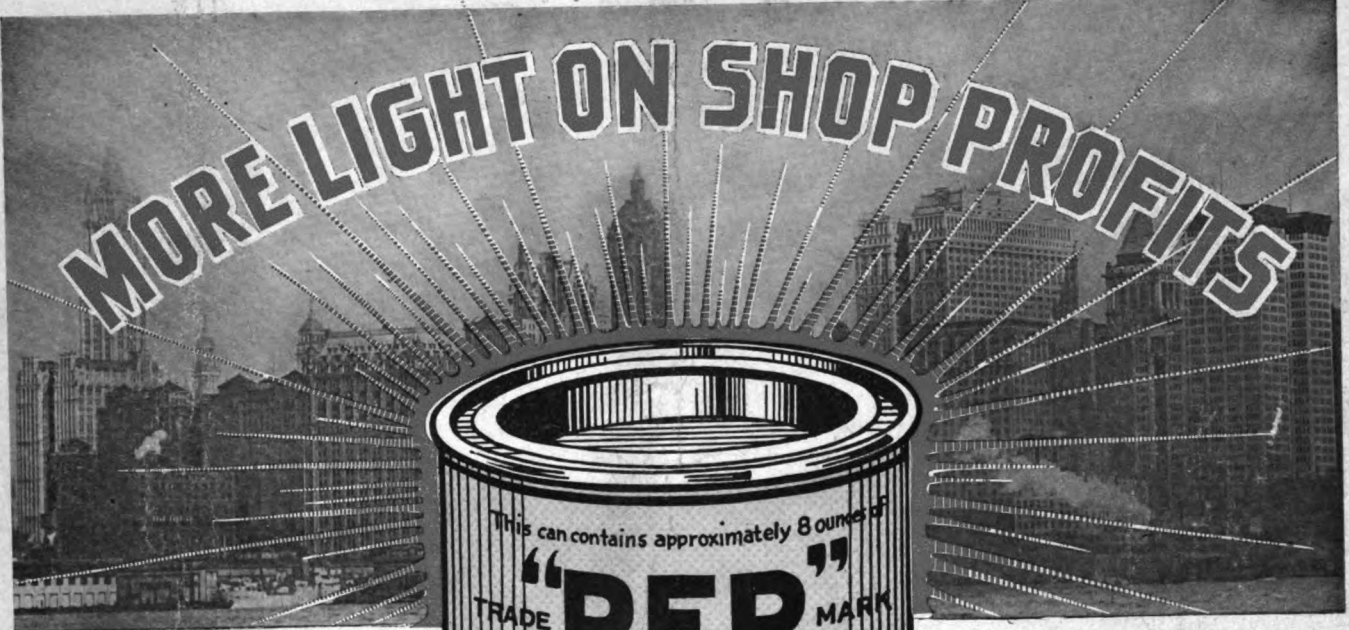
*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., JANUARY 1921.

NO. 6

## MORE LIGHT ON SHOP PROFITS



Pep is and we prove by every test a Logical Grinding and Lapping Compound. Pep is the highest developed, furthest advanced and most efficient grinding and lapping compound. Pep, being water-mixed, is based on three accepted scientific facts.

- 1st—Water aids friction, necessary in grinding and lapping.
- 2nd—Water as applied to ready-to-use compounds Must Not freeze. Pep does not.
- 3rd—Water-mixed compounds must not dry in the can. Pep does not.

All orders filled through jobbers when possible.. "PEP," is a proven constant repeater. Share in the almost unlimited possibilities for real business. If not stocked by your jobber, write for sample giving jobber's name. Quotation on application; shipments made immediately.

By meeting these requirements we developed "PEP," a non-lubricating grinding and lapping compound. "PEP," a non-drying grinding and lapping compound. "PEP," a non-freezing grinding and lapping compound.

### RESULT

"PEP" does The Job at a saving of at least 50% in time and completes the operation with ONE GRADE.

"PEP" is the fastest cutting, smoothest seating and Best compound, because it is the only Logical grinding and lapping compound on the market.

## WORCESTER ABRASIVE COMPANY

GENERAL SALES OFFICE  
166 2-4 BROADWAY, N. Y. C.

FACTORY  
WORCESTER, MASS.

# DORT

*Quality Goes Clear Through*



At the  
National Shows

*New York*

Grand Central Palace, January 8 to 15  
First Space  
at left of entrance on main floor

*Chicago*

Coliseum, January 29 to February 5  
Third Space  
left of entrance

The introduction at the New York Motor Show of the family of Dort cars portrayed above can be properly considered as nothing short of an event of impressive importance.

For the first time in the history of the automobile industry, we believe, a line of popular priced cars is now presented to the public with bodies that invite comparison with costly car creations.

Dort Motor Car Company  
*Flint Mich.*

(424)



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\$1.50 the Year

# AUTOMOBILE JOURNAL

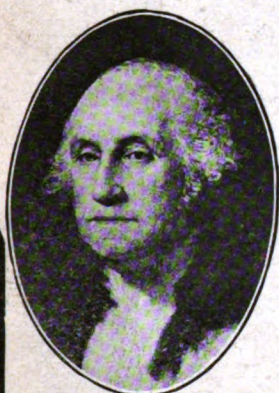
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*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., FEBRUARY, 1921.

NO. 7.



You Celebrated Their Birth

ONLY  
**ONE DAY**  
THIS YEAR  
—BUT—

By using the coupon in the corner you will receive a  
**FREE TRIAL CAN**  
THEN—YOU WILL

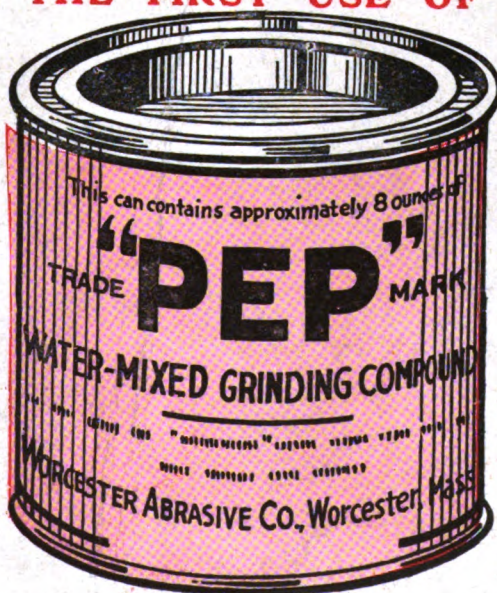


**CELEBRATE EVERY DAY**  
THE FIRST USE OF

No Oil or Grease  
Therefore  
More Grinding Friction

Water  
Mixed

Does Not  
Freeze



One Grade Only  
Starts and finishes  
Any Grinding Job

Does Not  
Dry or  
Rust In  
Can

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Dealer's Name \_\_\_\_\_  
If Individual User or Car Owner, Use This.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Jobber's Name \_\_\_\_\_  
If Garage or Repair Shop, Use This.

U. S. Patent Allowance

**Worcester Abrasive Co.**  
1664 Broadway, New York



**F**OR 14 years STERLINGS have been acknowledged to be among the highest quality tires made. Their virtues are numerous, but we believe the greatest one is an absolutely impregnable bead and side-wall construction.

Experience has taught us,—and practically all other manufacturers, that the bead and side-wall construction is likely to be the weakest point in any tire.

So we have specialized on it and we honestly believe (in which we are corroborated by exhaustive tests) that there is not a base construction which compares in strength with that in Sterling Tires.

Cords only, above 31 x 4; the Ford fabrics are as large as the average cord in their sizes—and every bit as serviceable. Air-bag expansion process cured, and with 5 plies of standard fabric instead of the usual 4.

If you'll let us send you a section and the price list, we're satisfied that you will do the rest.

## **Sterling Tire Corporation**

**Established 1908**

**Rutherford,**

**New Jersey**



# Sterling Tires





20 Cents the Copy

\$1.50 the Year

# AUTOMOBILE JOURNAL

*DEVOTED TO*

*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., MARCH, 1921.

NO. 8.



*Saves  
Time*



*The Logical Grinding Compound*

**Worcester Abrasive Company**  
1660-62-64 Broadway  
New York, N. Y.

*Saves  
Labor*

*Saves  
Money*



# *What do you want in the Tires you sell?*

We've devoted fourteen years to making good tires and making good plans to sell them.

What you want—we have; unless you are totally different from the army of successful dealers to whom we now sell.

The tire itself is hand made, air-bag cured, generously guaranteed, and moderate-priced.

We have specialized on what is generally the weakest point in any tire—the bead and side wall construction.

Exhaustive tests allow us to say that there is no base construction made which equals in strength, that in **STERLING** tires.

Let us send you a section and a price list.

We're confident of the result.



**Sterling Tire Corporation**

Established 1908

Rutherford,

New Jersey

# Sterling Tires





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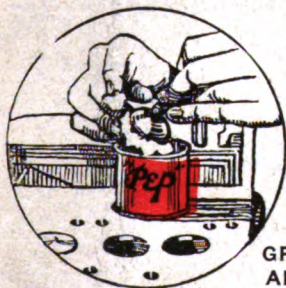
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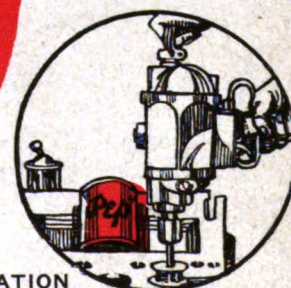
VOL. LXVIII.

PAWTUCKET, R. I., APRIL, 1921.

NO. 9.



ONE  
GRADE OF  
ABRASIVE



ONE  
OPERATION

U. S. Patent Allowance No. 413,073.

## Grind Valves in Half the Time—With Pep!

YOU can't mix oil with water. Nor can you mix oil with abrasive and produce a compound that will efficiently grind valves. For oil acts as a lubricant and only serves to envelop the abrasive in a thin film of oil which retards friction.

But with Water-mixed PEP there's a different story to tell. PEP works on the principle that water allows perfect freedom of movement. When water-mixed the particles of abrasive are livelier. No dragging the abrasive around in a thick body of oil when PEP is used.

PEP does its work with one grade of abrasive

in one operation, and does it in half the time required by the ordinary oil-mixed compounds. Only a water dampened cloth is required to wipe PEP ground valves.

If you have not already joined the growing host of PEP enthusiasts, accept this advertisement as our invitation. We want you to try Water-mixed PEP at our expense. We will gladly send any dealer or garageman in the country a sample can of PEP free of charge for testing purposes.

Shall we send you a can?

Worcester Abrasive Company 1660-62-64 Broadway New York City



Water-Mixed

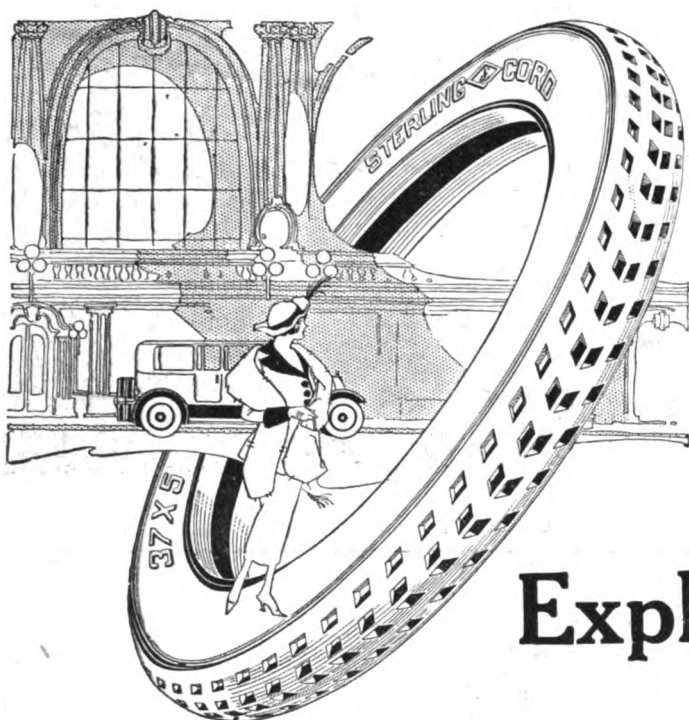
**GRINDING COMPOUND**

NON-DRYING NON-FREEZING  
UNEXCELLED FOR PISTON LAPPING

over  
**300**  
jobbers  
have "Pep"

and more are getting it daily See Advt in Directories.





*They say the  
Good die young*

**Exploded theory!**

STERLINGS are guaranteed for a ripe old age and we know they're good because we make them that way from the best materials we can get.

Cords only, above 31x4 sizes; and in the smaller sizes, the biggest, huskiest, 5-ply fabrics you ever saw—hand made, air-bag cured, and moderate-priced.

Guaranteed for 6,000 miles on fabrics and 8,000 on cords, but built to do much better than that.

Send us your address for a section and a price list.

We're satisfied that you'll do the rest.

**STERLING TIRE CORPORATION**

*Established 1908*

Rutherford,

New Jersey.

**Sterling  
Tires**





20 Cents the Copy

\$1.50 the Year

# AUTOMOBILE JOURNAL

*DEVOTED TO*

*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., MAY, 1921.

NO. 10.



## HERE'S HOW

Our toast to every garage owner in the country is a simple one. May he soon discover that Water-Mixed **PEP** grinds valves faster more efficiently and more profitably than any other compound on the market. Our free offer of a Sample Can proves the sincerity of this toast. *Will YOU have one?*

**WORCESTER ABRASIVE COMPANY**  
1664 BROADWAY NEW YORK



## ***1400 Sold and No Come Backs***

“Perhaps you would like to hear of our experience with the new STERLING 30x3½. In the past year we have sold over 1400 of them with practically no adjustments. In our opinion it is the best 30x3½ tire made, barring none; we are thoroughly sold and expect to have a big run on them this year.”

The foregoing from a retail dealer (not a jobber) in a middle size New England City. (Name on request).

Ask us about our “*New Deal for Dealers*” —something radically different in the tire trade.

**STERLING TIRE CORPORATION**

ESTABLISHED 1908

**Rutherford,**

**New Jersey**

**Sterling**  
 **Tires**



20 Cents the Copy

\$1.50 the Year

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*DEVOTED TO*

*OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS*

VOL. LXVIII.

PAWTUCKET, R. I., JUNE, 1921.

NO. 11.



Patent No. 1,380,382.

*Water-Mixed*

Valve  
Grinding  
Paste

***What does grease do on a file?***

***Grease does the same on a valve seat!***

PEP grinds valves **2** times as fast because it contains no oil nor grease to lubricate where you want friction.

PEP grinds **2** times as fast because you can use nearly **DOUBLE** the pressure on the valve you ever dared use with an old fashioned compound. No ringing—no grooving.

**2x2 are 4.**

You cannot prove nor disprove what we claim unless you write for a free sample of PEP to the

**WORCESTER ABRASIVE CO.**

1662 Broadway,

NEW YORK CITY



# 1400 Sold and No Come-backs

*"Perhaps you would like to hear of our experience with the new STERLING 30x3½ tire. In the past year we have sold over 1400 of them with practically no adjustments. In our opinion it is the best 30x3½ tire made, barring none. We are thoroughly sold on them and expect to have a big run on them this year."*

*New England Dealer  
(Name on request)*

These 5-ply oversize 30x3½ Sterlings are air-bag cured. Nearly equal to ordinary 31x4's in size and more than equal in strength and service.

Ask for our "New Deal For Dealers"—something radically different and profitable.

STERLING TIRES are all Cords except 30x3, 30x3½, 32x3½, 31x4.

They are big husky tires—all but 30x3 are air-bag cured. Fabrics are 5-ply instead of the usual 4-ply. All 4-inch cords are 6-ply: 4½ inch 8-ply.



All are hand-made and rigidly inspected. All have special bead lock-in and reinforced side wall construction.

There are no better tires of any make at any price. Sterlings carry the standard guarantee. Fabrics, 6000 miles; cords, 8000 miles.

With the newly reduced list price and our "New Deal For Dealers" any one willing to do business the Sterling way can make more actual net money profit and hold his trade better than ever before.

**STERLING TIRE CORPORATION**

*Established 1908*

**Rutherford, New Jersey**

# Sterling Tires





20 Cents the Copy

\$1.50 the Year

# AUTOMOBILE JOURNAL

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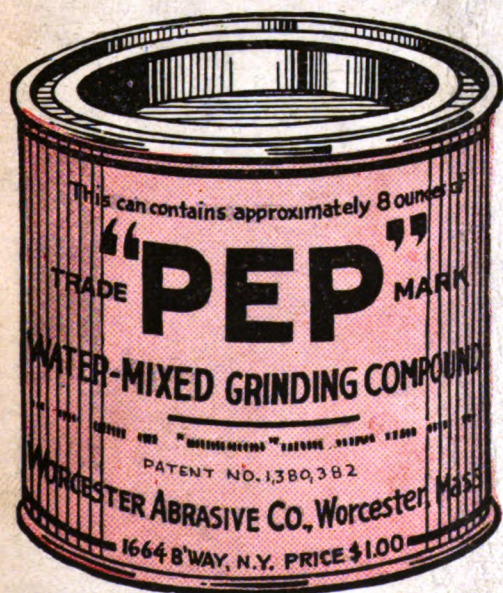
VOL. LXVIII.

PAWTUCKET, R. I., JULY, 1921.

NO. 12.



*-Faster than  
Tommy Milton  
did the mile-*



Would you put grease on a file? Then why put it on a valve seat at grinding time? What you want is friction. Did grease ever help friction?

"PEP" has ground a valve in less time than Tommy Milton took to circle the track! Not every valve can be ground that fast—but you can bank on "PEP" doing the job 100% faster than oil mixed compounds.

That's because "PEP" is **water mixed**—has no oil to lubricate or retard friction. And—you'll appreciate this—you can use nearly **double** the pressure on a valve that you ever dared use with an oil mixed compound.

"PEP" is made to **grind**—and you'll say it sure does its job **right**. A perfect, velvet-smooth surface, free from pit marks, grooves, or ruts, ground from start to finish with only one grade, and wiped clean with a damp cloth—that's what "PEP" means—and that's why you're missing something if you haven't tried "PEP" on the valves **you** grind.

Get a free sample can and make the test **now**!

Just a postal to

WORCESTER ABRASIVE COMPANY, INC.  
1660-2-4 Broadway  
New York City



Water-Mixed  
**GRINDING COMPOUND**

NON-DRYING NON-FREEZING  
UNEXCELLED FOR PISTON LAPPING





## **\$5,236.00 in Ten Days**

From June 1 to June 10, T. E. Carley, Tire Dealer, Paterson, N. J., sold \$5,236.00 worth of Sterling Tires (238) and Tubes (168) for CASH, in a special sale, in which we fixed the price to consumers so low they simply had to buy. And Mr. Carley made a lot of money too.

Since June 10, many other Sterling Dealers have had similar results.

We know how to move Sterling Tires from our dealers' racks at a *profit to the dealer*.

Shall we tell YOU about it?

**Sterling Tire Corporation**

***Rutherford, N. J.***

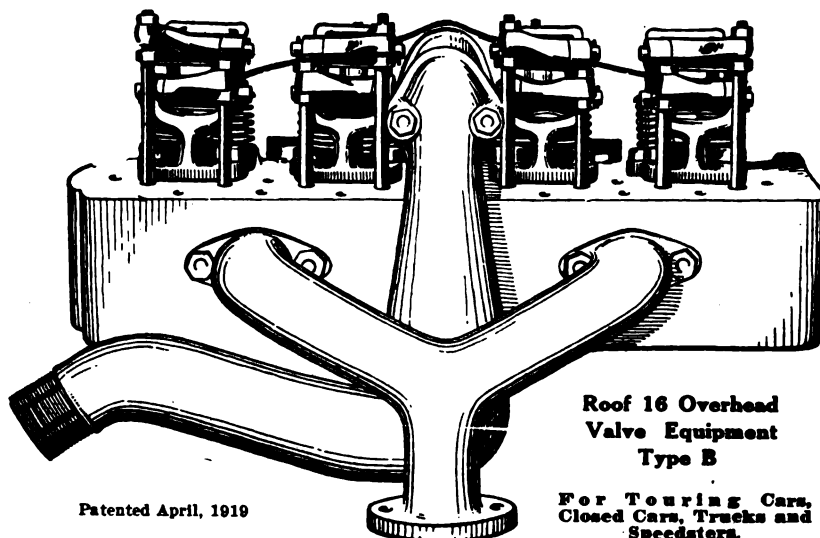
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# Sterling Tires





# POWER and SPEED ROOF 16 OVERHEAD VALVE EQUIPMENT for FORD and DODGE MOTORS

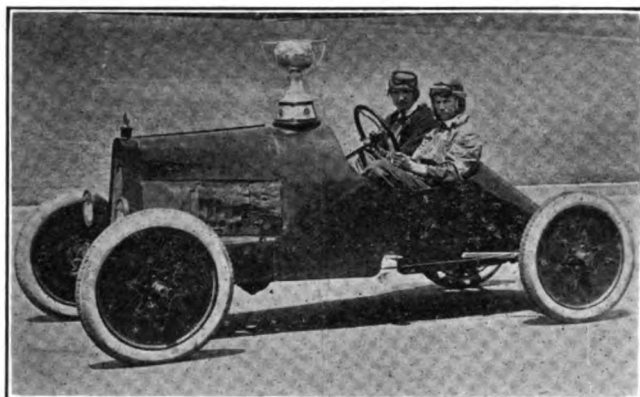


Roof 16 Overhead Valve Equipment Type B

For Touring Cars, Closed Cars, Trucks and Speedsters.

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same motor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at Bureau of Standards with Type B valve 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 8 to 1 gears, high speed camshafts, aluminate, light grey iron, and magnesium pistons, alum-

inite connecting rods, racing spark plugs, racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high tension magnetos, special oiling systems, special worm and gear steering gear, racing tires, racing bodies, hood and radiator, parts for undersliding chassis. Tell us what you want. We can supply it. Racing quality. Lowest prices. Send for our Complete Literature on how to build fast cars and double the value of your Ford Truck and descriptive circular on Speed and other Specialties for Fords and Dodges.



## Ford Racing Car Speed Kings

From the hundreds of fast Ford car drivers we mention the names of a few of those who have won laurels through the use of our equipment and some with speed records approaching that of the highest priced racing cars in the world, ranging from 70 to 97 miles per hour, and who on mile and half mile tracks have closely approached the world's record with their speed cars:

Cassie Wingate.....Daytona, Fla.  
Paul M. Boozer.....Windber, Penn.  
Tracy D. Mohnney.....Pittsburg, Pa.  
Ben Lawell.....Columbus, Ohio  
W. L. Frazier.....Washington, D. C.  
Herbert Black.....Webster City, Iowa  
John Proctor.....Washington, D. C.  
Rolly Blair.....Shelby, Neb.  
Joseph C. Hayes.....San Francisco, Cal.  
Aubrey Bereta.....Babylon, L. I., N. Y.  
Hugo Goedthe.....Milwaukee, Wis.  
W. C. Phalgrath.....Cheyenne, Wyo.  
Milner Motor Car Co.....Monroe, La.  
C. F. Goltry.....Roann, Ind.  
Fred Dawson.....Springfield, Ill.  
W. C. Norris Motor Car Co.....  
.....Oklahoma City, Okla.  
Alvin A. Pfeiffer.....Clatonia, Neb.  
J. Ross Castendyck.....La Salle, Ill.  
Fred Hank.....Cheyenne, Wyo.  
L. E. Kerbs.....Otis, Kan.  
Phil M. Kopley.....New Albany, Ind.  
A. Maltby.....Daytona, Fla.

J. M. H. Palmer.....W. Springfield, Mass.  
Robert Cusick.....Denver, Col.  
Chas. Skinner.....Willow Bunch, Sask.  
Joe Melson.....St. Charles, Ill.  
Sisk Motor Co.....Darlington, S. C.  
Dean C. Montgomery.....Atlanta, Ill.  
J. Christiansen & Son.....Galveston, Tex.  
Bozanni Bros.....Los Angeles, Cal.  
J. Marshall Yeats.....Champaign, Ill.  
Kirby Horton.....Cleburne, Texas  
N. H. Steele.....Racine, Wis.  
John G. Banzhaf.....Greenwich, Conn.  
Richard O. Fay.....Xenia, Ohio  
R. C. Wheeler.....Chattanooga, Tenn.  
W. J. Meagher.....Medford, Ore.  
Bert Wellington.....Casper, Wyo.  
N. C. Burdett.....Stuart, Ia.  
Perry La Merte.....Kalamazoo, Mich.  
Albert Willshaw.....  
.....Ft. Wadsworth, N. Y.  
Willard Brothers.....Ponca City, Okla.  
Roy A. Tolen.....Carlow, Mo.  
W. H. Hooker.....Bay Side, L. I., N. Y.

Ernest Watson.....Attleboro, Mass.  
Cliff Duhme.....Cincinnati, Ohio  
Brinker & Sheffer.....Gibsonburg, Ohio  
Roscoe J. Whitney.....Leominster, Mass.  
Frank Richardson.....Segourney, Ia.  
Roy A. Scofield.....Council Bluffs, Ia.  
Rister Garage.....New Harmony, Ind.  
Dennis Auto Co.....Ottawa, Kan.  
Tunica Motor Co.....Tunica, Miss.  
Irving Donohoe.....Washington, D. C.  
Speedster Shop.....Los Angeles, Cal.  
William Erwin.....Corcoran, Cal.  
Don Husted.....Marshall, Okla.  
Charles N. Davis.....Piedmont, Mont.  
Antone Bertoglio.....  
.....Twin Bridges, Mont.  
D. E. Snider.....Middletown, Ohio  
Roy M. Barzem.....  
.....Thief River Falls, Minn.  
Bay View Auto Co.....Cheriton, Va.  
A. Jackson.....Bloomington, Ill.

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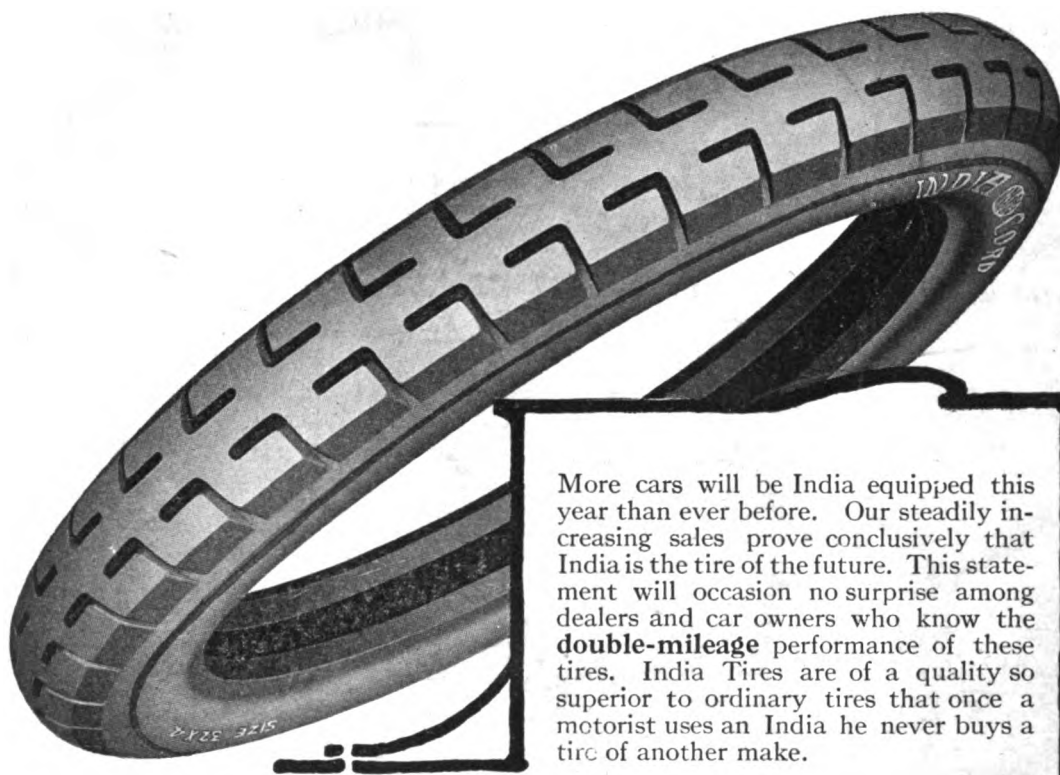
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ANDERSON, IND.

## J. A. Robison Baltimore, Md.

J. A. Robison, Baltimore, Md., in his Laurel De Luxe Ford Racer, winner of the ten-mile state championship race held May 30, 1921, at Prospect Park, Baltimore, Md., in which he broke the track record and easily defeated a large field of fast cars.

Comparison Brake Horse Power Tests by U. S. Motor Transport Corps at Camp Holabird, Md., gave standard Dodge motor 37.7 horse power. The Same Motor carrying our Sixteen Valve Cylinder Head Equipment showed **60 HORSE POWER.**

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